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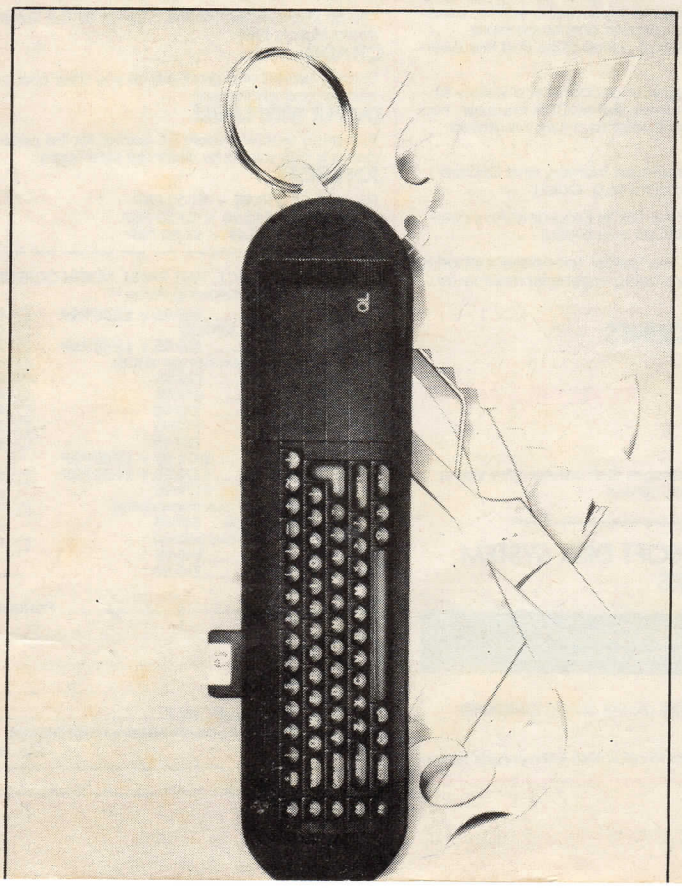

NEXT MONTH

QL Surgery

What do you do when your QL refuses to work? Whether it is under warranty or suffering from old age, we tell you what to do and where to go.

Company Profile

The first of our occasional in-depth looks at the people who provide the products.

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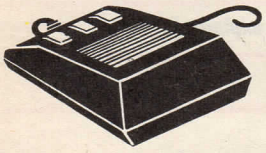
QL MOUSE



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VIEW - Examining a file
WDIR WSTAT WDEL WDEL_F - Wild Card Commands
STAT - Drive Statistics
WCOPY - Wild Card Copy
RENAME TRUNCATE
DATA_USE - Default Directory
CLOCK - Resident Clock
EXTRAS - Listing Extensions
FLP_SEC-security level
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QL SCENE

Quality control for QL

Major dealers, distributors and producers of QL peripherals and software have agreed to co-operate on a quality assurance scheme for QL products.

The scheme would involve suppliers ensuring standards of qualilty, service and support for their products, which would carry a sticker to indicate participation in the scheme.

The idea was suggested at a conference on the future of the QL hosted by *Sinclair QL World* and organised by Transform Ltd. More than 50 people attended the conference to determine the current level of support for the machine as well as to discuss plans for the future.

Among those present were dealers, distributors, software houses and hardware manufacturers from the U.K., Europe and the United States.

Virtually everyone spoke of their intention to continue support for the QL. Eidersoft and CST demonstrated Thor, the QL upgrade micro. Ken Browning of Eidersoft said that following an agreement between CST and Psion, the new micro would be bundled with the Psion exchange 68000 version of Quill, Abacus, Archive and Easel. Thor will be launched officially at the PCW show in September.

Carol and George Witham of A+ Computer Response, U.S. QL distributor, told the conference of the success of the QL in the States. A+ is providing full back-up and support services for American QLs which will shortly be re-packaged and sold with extra bundled software.

Hellmuth Stuven of Dansoft, a man well-known for his unbounded enthusiasm for the QL, described the history of the machine and implored those involved with the post-Amstrad QL not to make the same mistakes as Sinclair.

A number of software houses including Digital Precision, Pyramide and Talent announced plans for forthcoming new titles. Of the peripheral manufacturers, Sandy took the prize for the most vociferous endorsement of its products, and announced its intention to continue producing high-quality QL peripherals.

Amstrad wrangle with CST

Since the takeover of Sinclair, the future of the QL has been shrouded in mystery and speculation. With the recent announcement by CST of its QL upgrade, Thor, matters have now become more confused. The weekly computer press has reported Amstrad as stating that the intellectual property rights bought from Sinclair include the QL and that CST will be producing the Thor. illegally as it is based on the QL circuit board.

At a meeting arranged by Transform and *QL World* concerning the future of the QL, David Oliver of CST explained that as his company was buying stocks of QLs and simply upgrading them-not marketing them as a new product – it was not infringing Amstrad copyrights.

Following the Press reports we again contacted CST and a spokesman reiterated their previous statement, adding that he had heard none of the objections directly from Amstrad, despite numerous attempts to communicate with it.

In view of Amstrad's apparent reluctance to continue with the QL, it is difficult to understand the aggressive response to those who are. In any case, all the arguments may soon prove to be academic. A+ Computer Response, the U.S. distributor of the QL, has put in a bid bid which sources indicate has been well received.

Should A+ acquire world-wide intellectual property rights to the QL, the company has stated that it would be more favourably inclined to products such as Thor.

Sideways printers

Wenger Printers Ltd of High Wycombe, has joined forces with Dovetail Computers and has solved the principal weaknesses of the wide-carriage printer. With model type SDP4/1 that simply overcomes the problem by printing sideways.

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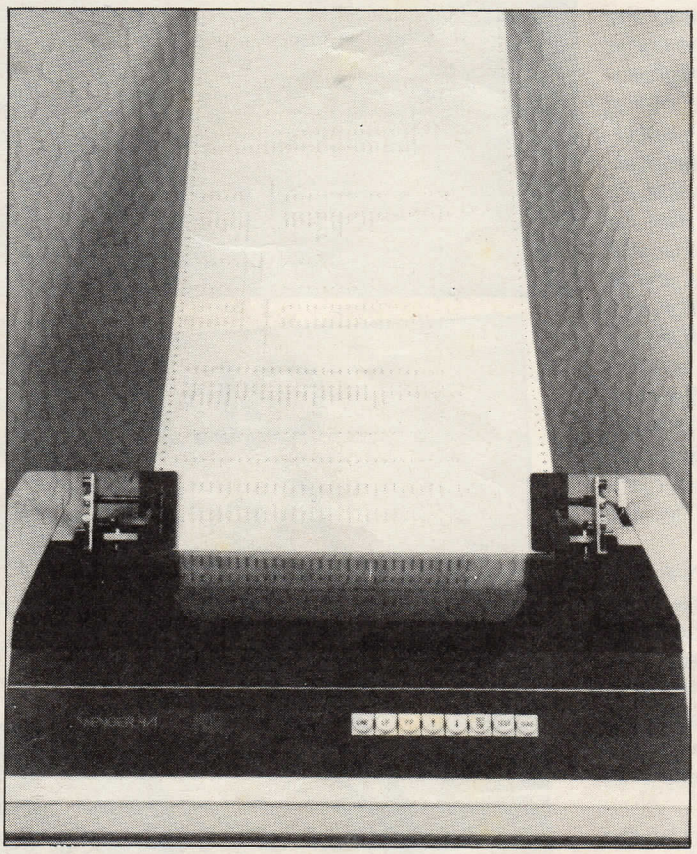
Further information from: Wenger Printers, 0296 624887



Self support from Epson

A technical support manual containing information and tips covering most Epson printers is now available from Epson dealers.

The manual, written by the Epson technical services department, is full of all the latest information normally available only by telephone from the Epson technical support.

Appropriate sections can be bought separately and if additional hardware or software information is required, plenty of suggestions are at hand.

The manual is in eight sections but for full information on some machines, both the original section and the section containing update information on the product will be useful. Prices range between £10 and £12 excluding VAT per section.

High speed plotter

A 6 colour high-speed plotter for £899 is now available from Micro Peripherals.

The high-resolution plotter has an accuracy of 0.025mm. with 56 resident plotter commands.

It is fitted with parallel and serial interfaces as standard and a choice of oil or water pens are available.

CODE IN THE MACHINE

Mastering machine code is not a Herculean task if you are properly equipped. James Lucy explains.

For many people programming in machine code is the unattainable goal, an art mastered only by dedicated red-eyed insomniac keyboard hackers. It is probably true that only a rare individual can mimic the action of the microprocessor in his mind so succesfully that he thinks like the machine and writes his thoughts in the form of a program, but we lesser mortals may still find utility in the arcane art.

The subject of this article, and the one which follows, are the ideas and the tools needed by the tyro machine coder to help him along the path to enlightenment. A start can be made with nothing more than a good book – see panel – the QL and a good measure of perseverance and patience, as will be shown later, and even the book will not be necessary if you wish to confine yourself to the program described in this article.

Unless you have the dedication of a novitiate Zen monk, an assembler will be necessary, together with a monitor – the software kind to reveal the inner workings of your program and to show you the error of your ways. This month the most popular assemblers are compared; monitors are reviewed for the next article.

The easiest way to introduce the writing of machine code programs is by means of an example. As will be seen, such a program is a sequence of numbers in memory which together cause the M68008 microprocessor to execute operations on another area of memory or on data held internally in its registers.

Two typical operations would be the movement of data from one memory location (address) to another, or the placing of a specified number in a register. Large quantities of these small building blocks can be put together to do something useful. Many of the most basic activities of the QL, such as fetching input from the keyboard, writing to the screen and handling files could be written by the programmer, but this needlessly would duplicate the herculean efforts of Tony Tebby, the designer of Qdos.

Appropriate documentation – see book panel – lists the approved methods of gaining access to the Qdos routines, so a QL machine code program typically might consist of instructions handling memory and data registers directly, together with calls to Qdos for the difficult portions. So it is with the example, which happens to be a variation on the classic first program in the C language which writes 'Hello World!' to the screen. Here it is, in assembly mnemonic format – ignore the numbers on the left for the moment:

The text part of the program, the mnemonics and their parameters, constitute an assembly language program in a form which is supposedly comprehensible by humans. The hexadecimal numbers in the centre columns are the output from an assembler program which has converted the mnemonics into machine language, i.e., numbers. These numbers have been further converted to unsigned decimal in the leftmost two columns simply so that they can be placed into memory using the SuperBasic POKE_W command. These will be of interest later. Although an assembler has been used in this case, it would have been possible to calculate the codes manually by reference to some of the books listed in the

Example

Decimal		Hex		Mnemonic	Parameters
17402	12	43FA000C		LEA	MESS(PC),A1
37320		91C8		SUBA.L	A0,A0
13432	208	347800D0		MOVE.W	$D0,A2
20114		4E92		JSR	(A2)
20085		4E75		RTS	
16		0010	MESS	DC.W	16
18533	27756	4865	6C6C	DC.B	'Hello QL World!'
28448	20812	6F20	514C		
8279	28530	2057	6F72		
27748	8480	6C64	2120		

panel – for example the mnemonic RTS is always coded as the box number 4E75.

The action of the example program is as follows:

1. Put the address of the message in register A1
2. Set register A0 to zero by subtracting it from itself
3. Place the contents of memory location $D0 in register A2. Regardless of the version of the ROM, $D0 will always contain, or 'point to' the routine we want, which writes a message to the screen
4. Jump to the subroutine whose address is in register A2.
5. Go back to the caller, in this case SuperBasic

There now follows the data to be used in the program:

6. Put 16, the number of characters in the message in a word of memory
7. Put the bytes representing the ASCII values of the characters of the message into consecutive byte-sized locations.

As can be seen, the program places some values in the microprocessor registers, reads a value from the ROM, and then executes a Qdos vectored routine – all in all a typical QL machine code program. The final problem is in getting the program into memory and running it. An assembler would generate a file containing the codes which could be loaded into memory using the SuperBasic LBYTES or possibly EXEC commands, but at the moment we have only decimal conversion of the program codes. The following short SuperBasic program reserves some memory and allows the decimal numbers to be entered:

```
1. a=RESPR(512) : c=a
2. REPeat loop
3. INPUT#0, 'number?' : b
4. IF b=-1 THEN EXIT loop
5. POKE_W a,b : a=a+2
6. END REP loop
7. REPeat loop2 : CALL c
```

Save this program before you run it, when a prompt for a number will be displayed in channel 0. Enter all the decimal numbers in turn, pressing ENTER after each. When all the numbers have been entered, make sure any Microdrive cartridges have been removed, then enter -1. You have just produced your first machine code program.

Flushed with success, we can now look briefly at the various alternative methods of running machine code routines. One way is the foregoing idea, loading the code into resident procedure space and then CALLing it. Perusal of the keyword section of the QL User Guide will show that CALL can be followed by parameters which set the values of most of the registers on entry to the routine, so the same code can produce a number of results if required.

It would also be possible to link the routine to the SuperBasic interpreter, perhaps under the keyword name 'HELLO', and in that case each time 'HELLO' was used in a SuperBasic program the message would be displayed in channel 0 or 1.

The method of adding to the SuperBasic vocabulary is not difficult and is explained in a number of the recommended books. The third, and potentially most interesting option, is to run the code as a job, using the SuperBasic EXEC command. Because more than one job can run at once, several copies of the program could be in action simultaneously.

The problem with the present code as a job is that it ends with the instruction RTS, which implies it has been called as a subroutine by another program, in this case the SuperBasic interpreter – analogous to old-fashioned Basic GOSUB and RETURN. If the code is to be run as a job it will be executing in its own right and should not end with RTS.

A solution is to form a loop, replacing the RTS instruction (opcode 4E75) by an instruction which means, broadly speaking, 'branch to the instruction 14 bytes before where I am now'. The opcode for that happens to be 60F2 or 24818 in decimal.

So if you run the SuperBasic program again, having changed line 7 to read SEXEC mdv2_ hellow,c,32,512, and when entering the opcodes you type the opcode of the branch instruction (24818) instead of that for RTS (20085), the result will be an executable file on mdv2 called 'hello'.

The keyword SEXEC is detailed in the QL User Guide. The program can be run by typing 'EXEC mdv2_hello' and will multi-task with the SuperBasic interpreter, although you will soon get tired of messages being inserted into your every command line.

You will need to read Andrew Pennell's book on Qdos to find why the running of multiple copies of this program does not produce the expected result, and why CTRL – £5 fails to freeze the screen. The easiest way of getting rid of the program is to re-set the QL.

By now, you should have a good idea of what a machine code program is and how it is loaded and run. The way you translate your ideas into an assembly language program will have to be left to one of the recommended books but a topic you will not find covered is the choice of an assembler.

An assembler is a program which accepts a number of assembly language instructions as its source and produces, either in memory or in a file, sequences of numbers which constitute machine code programs. It may also produce various listings containing information useful to the programmer. As has been shown, it is possible to translate your assembly language into the corresponding machine code numbers by hand, using information supplied by the manufacturer of the microprocessor; the assembler does it much faster and more reliably.

The Catch-22 situation with most software purchases applies strongly to assemblers; you are not sure what you need from the program until you have bought one and, perhaps, discovered its limitations. Accordingly, in the following paragraphs we explain the terms of reference used in the assembler comparison panels, together with some other points to consider if you are thinking about buying an assembler not included. The notes should help you decide which factors are important to you

Assembler

Supplier: Computer One Ltd, Science Park, Milton Road, Cambridge CB4 4BH
Tel: 0223 862616
Price: £19.95

Editor

Size: 18KB
Type: Menu-driven
Comments: This editor leads you by the hand, displaying on the various menus only those options which are available at the time. The range of editing facilities is limited, but in normal use the editor seems fast and effective

Assembler

Size:	18 KB
Macros:	No
Linker format output:	Yes, suitable for Computer One linker
Listing control:	None
Error reporting:	Very good

Comments: Slightly non-standard in requiring comments to be preceded by a semicolon and in refusing to accept labels with full stops – many Qdos constants contain them. No listing control but at least listing includes a symbol table. Allows conditional assembly and is very fast in operation.

Linker

Rudimentary but effective, can accept commands either direct or from a file. Occupies only 4 KB.

Documentation

Fifty-page typeset book with loose-leaf supplement for linker. Clear and informative – except lift facility – and inlcudes some examples, duplicated on the cartridge.

Conclusions

A very neat, compact package. It is easy to use and has a fast turn-round time, as even with both editor and assembler in memory there is plenty of room to assemble source code from RAM. It represents a good proposition for the beginner, who will like the editor and the fast turn-round, but the advanced user will regret the lack of macros and listing control.

Continued on page 10

Continued from page 9

QL Assembler

Supplier: GST Computer Systems, 91 High Street, Longstanton, Cambridge CB4 5BS Tel: 0954 81991
Price: £25
Editor Metacomco editor included
Assembler

Size:	18 KB
Macros:	No
Linker format output:	No, but see comments
Listing control:	Good
Error reporting:	Good

Comments: A neat and fast program. Pre-assembled binary files may be included but only by the devious means of creating an offset table by hand and then including it in the source. The Qdos constants file included on the cartridge contains more information than I have seen published elsewhere.

Linker
None.

Documentation
A microscopic ring binder contains about 120 pages of accurate but uninteresting text. The useful example file on the cartridge is not mentioned in the manual.

Conclusions
A well-presented program at the cheaper end of the market. It benefits from the Metacomco editor but offers fairly basic assembler facilities. Speed and ease of use make it a good choice for simpler assemblies and it is a program I use if I need to assemble a few lines quickly.

and worth paying for and which are not. In some cases the extra features must be paid for in memory requirement, loading time and convenience as well as in money.

Editor: All assemblers are provided, usually as a separate program, with a text editor, which is a simple word processor used to prepare the assembly language source code. Editors vary in their convenience, speed, compactness and philosophy.

Some adopt the menu-driven approach, which is good for people with bad memories or for poor typists, and some use direct commands which can be very convenient and fast for the experienced user.

The choice of editors is not so great as it might appear, since the GST assemblers are supplied with the excellent Metacomco editor and the Assembler Workbench editor supports a subset of the most useful Metacomco editor commands. The Talent version is also interesting, in that it is implemented as a SuperBasic extension, is re-entrant so that several files can be open to one copy of the editor, and it sets up a device like mdv1_, with the same name as the file, e.g., mdv1_filename.

The file then appears to be a RAM file which greatly speeds filing operations and in this form is also very useful for SuperBasic program editing. It is possible to produce source files with Quill if you so wish, although the finished product must be printed to a file, rather than using the Quill 'save'.

Motorola standard: Since the dialect of assembly language used by the QL is determined by its Motorola microprocessor, it follows that conformity with the Motorola standard is desirable. All the assemblers considered conform either closely or completely and in assembling source intended for one assembler with another, more difficulty will be experienced with differing assembler directives than with divergence from the Motorola standard.

Assembler directives: They are instructions to the assembler to control its action. In general, they do not produce any machine code but since they are included in the source file, differing directives can cause confusion when typing-in magazine listings.

Directives control such matters as

Assembler Workbench

Supplier: Talent Computer Systems, 101 St. James Road, Glasgow G4 0NS Tel: 041 552 2128
Price: £25
Editor

Size:	6 KB re-entrant
Type:	Command driven

Comments: A very original program. Written in machine code; supports a subset of Metacomco editor commands, without the repeat structures and the duplication of direct commands as indirect. Implemented as a SuperBasic extension and is re-entrant, so several files can be open to it without excessive memory use. Introduces the concept of RAM files, meaning that a file is edited, assembled and corrected with no Microdrive access. Reserves memory as required.

Assembler

Size:	10K, but loaded from 19K monitor
Macros:	No
Linker format output:	No
Listing control:	No
Error reporting	Fair

Comments: The assembler is loaded from within the monitor. It can be used as a single-line assembler to modify instructions in memory or in two-pass mode to assemble a program taken from the keyboard or a file. The object code can go straight into memory or into a file. Library files can be incorporated and most Qdos constants are pre-defined.

Linker
None.

Documentation
No hard copy is supplied. The numerous help files on the Microdrive, accessed through an automatic indexing system, contain detailed information and act as very useful reference once the program has been learned but are not easy initially.

Conclusions
An interesting and original program. The assembler is probably best-suited to fairly light work and lacks macros. Very fast turn-round time and remarkable value, particularly as the monitor and editor are also impressive. A winner from Talent but a manual is badly-needed. It is the only program in the group to be copy-protected.

macros, listing formats, conditional assembly and other features.

Listing control: An assembler listing is a file or printout containing the source assembly language instructions, the corresponding hex machine code and the address of each instruction relative to the start of the program. In addition, a symbol table may be produced which will list the values of the various symbols used in the program.

For most users no special format is required but you may require listings in a neat form with definable page widths and lengths.

Macros: Macros tend to be a feature

Assembler Development Kit

Supplier: Metacomco, 26 Portland Square, Bristol BS2 8RZ Tel: 0272 428781
Price: £40
Editor

Size:	21 KB
Type:	Command Line

Comments: The most popular QL editor, supplied with the GST packages, too. A fast, well-reasoned program with a very large range of commands, including repeat structures. It is a pity that it is necessary to specify the memory requirement in advance, which can cause problems when loading files of unknown size. Default drive names would be helpful, too.

Assembler

Size:	40 KB with 3, 6 and 7 KB overlays
Macros:	Yes
Linker format output:	Yes
Listing control:	Yes, comprehensive
Error reporting:	Excellent

Comments: Very large, including three overlays, which makes assembly a slowish process on an unexpanded machine, when it is not possible to have the editor and assembler in memory simultaneously. Simple and useful macro facilities and conditional assembly. A well-proven favourite of many serious programmers and relatively easy for a beginner to use.

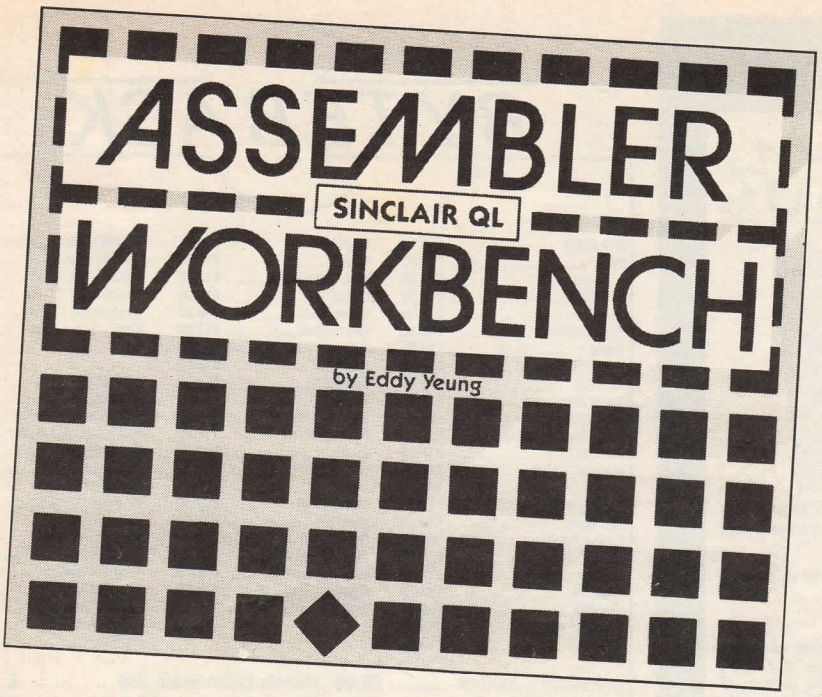
Linker
Simple linker which accepts files generated by the assembler only.

Documentation
Seventy-page typeset booklet providing easily-assimilated information. Includes useful examples.

Conclusions
Metacomco was one of the first in the field with a QL assembler and since its introduction numerous detail, but no major, improvements have been made. It is a workmanlike and popular package but now has some strong competition at the top end of the market.

of the more expensive assemblers. Put simply, they allow sequences of instructions which are used frequently in a program, such as calls to Qdos, to be assigned a name (a macro) which is used in the source code instead of the instructions.

As with a SuperBasic procedure, parameters may be passed which can



Assembler Workbench. A winner from Talent – but no manual.

DevpacQL

Supplier: HiSoft, 180 High Street North Dunstable, Beds. LU6 1AT Tel: 0582 696421
Price: £39.95

Editor

Size: 25KB - includes Assembler.
Type: Command line (ALT + letter) + prompt.
Comments: An effective editor. Commands are entered using the ALT key and prompts are then displayed for filenames as required. Help is always available and a status display shows line and column numbers and memory remaining. Unusually and usefully, the editor window can be re-sized at any time.

Assembler

Macros:	Yes
Linker format output:	Yes
Listing control:	Yes, good
Error reporting:	Good

Comments: The assembler is invoked from within the editor using the command ALT-A. The macro facility is simple and is compatible with the Metacomco format. Conditional assembly and the inclusion of other source files are provided for but there is no facility to incorporate previously-assembled binary files, i.e., libraries.

Linker

None.

Documentation

A booklet containing 30 rather fuzzy Apple Laserwriter-produced pages. Despite its extreme brevity, the manual is comprehensible and readable. It raises expectations of a tutorial section at the end, only to dash them by referring to a short program in the other manual in the package, that for the monitor program, MonQL.

Conclusions

The assembler is very fast and the integrated editor/assembler package works well. I found the editor fast and easy to use. The package includes a copy of the monitor/disassembler MonQL, which will be considered next month.

QL Macro Assembler

Supplier: GST Computer Systems, 91 High Street, Longstanton, Cambridge CB4 5BS Tel: 0954 81991
Price: £40.

Editor Metacomco editor included.

Assembler

Size:	30 KB
Macros:	Yes
Linker format output:	Yes, by default
Listing control:	Comprehensive
Error reporting:	Very good

Comments: A very full implementation. The macro facilities are generous almost to a fault and include string slicing, variables and a surprising range of functions. A file of useful ready-made macros is included on the cartridge. The most comprehensive assembler for the QL by a big margin.

Linker

This linker is becoming established as the QL standard. It is very comprehensive and will link any module in the standard relocatable format, including those produced by compiled high-level languages – note that SuperBasic compilers for the QL do not produce appropriate files. Like the assembler it is somewhat daunting for the beginner and a control file must be generated to access the more advanced facilities. The rewards are considerable and a bewildering array of debug tables, symbol listings and cross-references may be produced. It might make the tea if you get the control file correct.

Documentation

An A5 binder is supplied, housed in a black plastic box. The editor documentation is a reprint of that of Metacomco; 90 pages are devoted to the assembler and 50 to the linker.

Conclusions

An excellent purchase for serious software developers and advanced enthusiasts.

alter the action of the macro. Used in conjunction with conditional assembly controls, a good macro implementation almost constitutes a programming language in its own right and can shorten source code considerably.

Beginners may feel they have sufficient difficulty learning assembly language without learning a further assembler control language to help them write it. The GST macro assembler has a very good provision for macros and includes a macro library on the cartridge.

Linker: You may wish to write your code as a series of blocks, assembling each as you go, or you may want to join sections of machine code to code produced by high-level language compilers such as C. Some programmers have libraries of ready-assembled routines. Provided the assembler is capable of generating code in the standard Sinclair Relocatable Object File Format, or a format specific to itself, a linker will join individual blocks and produce an executable program.

The Metacomco linker is restricted to code produced by the assembler; the Assembler Workbench and GST QL Assembler do not have linkers but allow previously-assembled code to be included by a rather roundabout method. The GST macro assembler has an excellent and comprehensive linker.

Error reporting: A variety of techniques are used to recognise errors in the source code and to report them. The user needs clear, accurate and concise error messages and it is regrettable if one error causes subsequent perfectly valid statements to be reported as errors.

The Computer One assembler has a neat system of creating an errors file with the same name as the source but with the extension_err. That is loaded

That is loaded preferentially by the editor and contains the original source with all errors highlighted. When they have been rectified the original file can be over-written with the corrected version.

Turn-round time: For the beginner, this is probably the most important consideration. It reflects the time taken to load a small file, edit it and save if necessary, assemble it, and then reload it into the editor to correct errors. The Assembler Workbench has some very clever ideas in this department and works quickly.

The Computer One assembler/editor combination is also very fast, as is the well-integrated DevpacQL. The large files and overlays used by Metacomco, and the fact that the editor and assembler cannot co-reside in an unexpanded machine, mean that it seems very slow. On the other hand, most Metacomco users will probably have expanded memory and/or discs, in which case no difficulty arises.

Continued on page 13

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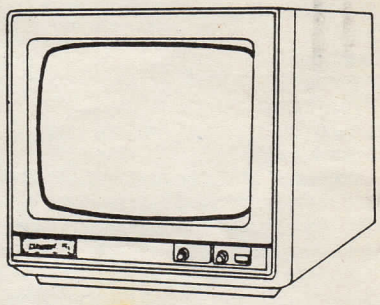

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Continued from page 11

Documentation: Good documentation is the vital final link in the chain from the software author to the user and the user's perception of the product is influenced heavily by the documentation provided. The Assembler Workbench includes a clever on-line user guide but provides no hard copy except a card offering the manual in Quill format – for more money of course.

The main help file may be copied to a printer, assuming you have one and that you are prepared to tolerate formatting marks. That is not acceptable, particularly if, like me, you read software documentation in the bath. The smaller GST manual is for people with good eyesight and is not above using a whole page rigorously defining the syntactic token of a [number] in a particularly impenetrable way.

HiSoft crushes documentation of a macro assembler and editor into 30 laser-written pages which surprisingly prove to be reasonably accessible. Unlike any of the others, it provides a Motorola programmers' pocket guide.

- *Next month, James Lucy will look at the various monitors available for the QL.*

CODE IN THE machine

Recommended reading

Qdos

QL Advanced User Guide £15
Adder Publishing
Adrian Dickens
ISBN 0 947929 00 2
Very good for Qdos and contains a short introduction to 68000 programming. Several useful examples.

QL Technical Guide £15
Sinclair Research
Tony Tebby & David Karlin
ISBN 1 85016 036 8
Short on examples but slightly more detail than Dickens on some aspects of Qdos. Written in minimalist style and not particularly suitable for beginners. No attempt to cover 68000 programming.

The Sinclair Qdos Companion £7
Sunshine
Andrew Pennell
ISBN 0 946408 69 6
Much cheaper than the other two. Contains the author's investigation of Qdos, with some very useful comments and examples. Well worth having for the different perspective and would probably be adequate on its own.

68000 programming

Programming the M68000 £9
Addison-Wesley
Tim King & Brian Knight
ISBN 0 201146 35 5
Rather expensive for a slim, poorly-produced volume but providing you can read the print offers the best introduction for 68000 programming. It is a tutorial rather than a reference book but the excellent index has the knack of always pointing to the required information. No reference to the QL and no opcodes.

Assembly Language Programming
on the Sinclair £8
(Programming the 68008 microprocessor)
Sunshine
Andrew Pennell
ISBN 0 946408 42 4
Once you have recovered from the title, it proves to be a good introduction to the 68000. Everything is related to the QL and there is much useful information on QL-specific matters. The opcode for each mnemonic is included, so the book can be used for hand-assembling code.

MC6800 16/32-bit Microprocessor
Programmers Reference Manual
Prentice Hall
ISBN 0 13 566795 X
Contains everything you could want to know about the software aspects of the 68000 but nothing about the QL. Not suitable for bedtime reading.

Glossary

The glossary is intended to be helpful rather than rigorous.

Address: A number representing a specific memory location in the QL, e.g., the start of the screen memory is at $20000.

Assembler: A program which accepts assembly language mnemonics as its source code and translates them into machine code. Also used as shorthand for assembly language.

Assembly Language: The set of mnemonics and acceptable parameters which can be translated by an assembler into individual instructions for the microprocessor, e.g., ADD.L D1,D2

Editor: A program supplied with assemblers to allow the preparation and amendment of source code. Effectively a simple word processor.

Hexadecimal: Usually abbreviated to hex. Numbers with a base of 16, with digits running 0-9 then A-F. In Motorola convention, hex numbers are preceded by a dollar sign ($). For example, $IF = 1*16+15 = 31. They are used for their very close relationship to binary, the number base used by almost all computers, including the QL.

Job: Also known as a task. An individual program which is acknowledged by Qdos to be present in the machine, although it may not be running. There is always at least one job present, the SuperBasic interpreter.

Linker: A program supplied with some assemblers which joins machine code files to form an executable program. The files may have been produced with an assembler or may be the result of compiling a high-level language like C.

M68008: The Motorola microprocessor in the QL. Assembly language is specific to a microprocessor, so it follows that M68008 assembly language must be used.

Machine code: A collection of opcodes. A machine code program consists of sequences of numbers which will cause the microprocessor to carry-out sequences of operations, i.e., a program.

Macro: An instruction to the assembler to cause it to act as if several pre-specified assembly language instructions were present. A useful method of abbreviating source code.

Mnemonic: A code used by the assembly language programmer to indicate a certain type of instruction to the assembler. Chosen to be easy to remember, so NOP, for example, means no operation and has an opcode of 4E71 hex.

Monitor: In the software sense, a program which allows the running of a program to be supervised, usually with a range of facilities such as a continuous display of register values and the ability to step through the program one instruction at a time.

Object code: The machine code result of assembling source code.

Opcode: Short for operation code and, loosely speaking, a number which is understood by the microprocessor and which will cause it to carry-out one of its basic actions.

Qdos: A collection of useful machine code subroutines which carry-out mundane but complicated duties such as controlling the Microdrives and writing to the screen. It also supports multi-tasking. In my opinion, a remarkable programming achievement.

Registers: The M68008 has a number of registers, which can be thought of as mostly 32-bit areas of internal RAM which are used for storing addresses, data and other information.

Source code: A file, or directly-entered collection of assembly language instructions.

Vector: An address containing another address. Qdos contains many vectored utilities whose start addresses are not necessarily the same for different versions of the ROM. There is a vector table – i.e., table of addresses – in the ROM which always appears in the same place and which contains the relevant routine start addresses.

OPEN

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to:

Open Channel
Sinclair QL
Petty France
London SW1H 9ED

Soccer software

I wonder if you or any of your readers could assist us to obtain a program which would enable us to computerise our league tables? We operate one of the biggest boys' football leagues in the country, some 110 teams split into nine age groups, and a program to formulate them would be a big advantage.

So far as I am aware there is no commercial package available but if you or your readers know otherwise we would be very interested.

R. Darley,
200 Perran Close,
Bransholme, Hull.

ROM required

The recent acquisition by Amstrad of the Sinclair rights prompts me to write concerning a problem which probably affects many other QL users.

I have a JM-ROM D12-hardware QL purchased some seven months ago and like the machine more as I use it. Like many others, I am sure, I have realised that we would greatly appreciate the SuperBasic improvements offered by the later JS-ROM. I am thinking particularly of the WHEN ERROR construct. My QL will parse the line correctly but that is as far as it goes, since it produces a variety of errors on trying to use it.

Can you advise me on the possibility of obtaining an updated ROM? I am told that JM-ROM QLs "won't recognise" more than one add-on external hardware device. Of what practical significance is this to someone who plans only one disc drive plus a printer?

Thank you for an excellent magazine – keep it up.

Paul Newman,
Leiston, Suffolk.

Support

Now that it has been intimated in the press that the QL is no longer being manufactured, what serious advice would you give to a professional user who has invested nearly £1,000 so far and has been contemplating the additional costs of disc drives, additional memory, and so on, and others in a similar position?

R.W.C.,
Holland Park,
London.

Editors reply: Judging by the commitment given by dealers, hardware manufacturers and software houses to continue support for the QL (see QL Scene), our advice would be to go ahead.

You have already made a substantial investment and it is no less likely that you will receive continued back-up and support for new peripherals.

Where to get Psion

Have you any information regarding the support for QLs now that Amstrad has taken over? I sent an order on April 18 for version 2.3 of the four QL programs to Camberley, as printed in *QL World*, and have just received back my cheque with a printed apology from Cambridge.

Is anyone likely to take over the distribution of 2.3?

W.J. Wilson,
Botley,
Southampton.

Editor's reply: The latest versions of the programs – Quill, Abacus and Easel V2.35, Archive V2.36 – are available from Psion priced at £9 each. The address is: Psion House, Harcourt Street, London W1.

Pounds of printer

For all those who bought the offer pack of QL plus 8056 printer from Dixons and have had difficulty getting the printer to accept underlining, here is the way to do it.

According to the manual, underline is switched on by the command 'ESC – 1' and off by 'ESC – 0' but when those codes are entered into the printer driver they generate a peculiar symbol at the start and finish of the underlining. The correct codes which work are underline on 'ESC," –,SOH' and underline off 'ESC," –,NUL'.

The other problem I found was getting the printer to print the pound sign. That is done very easily by entering at the TRANSLATE 1 position '96,156'.

I hope this information will be of use to other QL and serial 8056 users.

G.M. Harrison,
Chatham, Kent.

Curious cartridges

I would like to draw attention to a curious circumstance concerning Microdrive cartridges. As you know, a new cartridge should be formatted before use. I bought from a local specialist computer shop six new cartridges in their sealed bubble-packs and, out of curiosity, did a DIR command before formatting. To my surprise I found that five of the cartridges were already QL-formatted and had been given names.

The names of four were dates of the form 7/8/85, although it is not immediately obvious to me how one FORMATs a cartridge with a name incorporating the slash character and the four cartridges were otherwise empty of data or programs. The fifth cartridge had been given the name "TEACH2" and contains three program files – backup, teach6, teach7.

On investigation, it appears that "teach6", a lengthy SuperBasic program, is an interesting and detailed tutorial intended to be used with a textbook or course on Risk Profile Analysis. If you use it you will find it necessary to press "r" and "p" simultaneously to get past the opening screen, and "I" to proceed beyond the subsequent examples.

At a later stage "teach6" gives the user the option of calling-up a non-existent menu from mdv1; "teach7", although listed in the directory, is apparently non-existent; "backup" is intended to back-up not only itself and the other two files but also "teach8" and "teach9" which are not on the cartridge.

Two points come to mind. Some "new" Microdrive cartridges are certainly not pristine and unformatted. More important, there is the possibility that confidential or commercially-sensitive programs or data are inadvertently being released to the public in this manner.

Trevor Jennings,
Ashton, Bristol.

Bad flight?

I am very surprised at the ecstatic response with which *QL Flight* by Microdeal has been met from your magazine and reviewers since its release. Are you aware that this program was first released for the Dragon 32 and Tandy colour computer in the Winter of 1984 under the name *Worlds of Flight?* All reviews and screen shots reveal that the program has been converted to the QL with only some extra colour having been added. The Dragon version had the same nine worlds, screen layout and wire graphics as is now on the QL version and sold for £7.95 as opposed to the QL price of £19.95.

Although the Dragon was an excellent machine in its time, consider the differences between the two computers. The Dragon had about 25K available to the programmer, the QL more than 90K. The Dragon's processor was the Motorola 6809 running at less than 1MHz. The QL uses the 68008, the 6809's big brother, and runs at 7.5MHz. The graphic resolution of the Dragon was 256 x 192 pixels as opposed to the QL's 512 x 256 pixels.

Given those big differences and the program's heritage, I find it sickening to find this simulator being voted the most innovative new QL product in the *Sinclair QL World* awards. It may be the best we have but it is not great by any means. Just consider the excellent range of flight simulators available for the 48K Spectrum and Commodore 64. Why should we be happy with this pathetic offering when we own machines with vastly superior processing power and memory systems?

A. Wond,
Leuchars, Fife.

CHANNEL

Book list

I am trying to learn assembly language on the QL but I am finding it frustratingly difficult to find a good piece of literature on the subject suitable for the absolute beginner. I have in my possession the Metacomco Assembler, Tony Tebby's new monitor QMON II, *QL Advanced User Guide* by Adrian Dickens, and *6800 Assembly Language Programming* by Kane, Hawkins and Laventhal but what I need is a book which will tell me, as simply as possible, how the Motorola 68008 works and how to program it in assembly language, thus stringing together the information.

So far I have been recommended by Tebby *QL Assembly Language Programming* by Colin Opie as a good book, despite bad press reviews, for a simple explanation of the Motorola 68008. Please could you advise me on the subject?

John Bainbridge,
Faversham, Kent.

Editor's reply: Just turn to our Machine Code feature starting on page 8 where you will find advice.

Immortal BJ

While I was looking through the code of BJ The Return, using QJUMP Qmon monitor, I discovered a way of getting infinite lives. Any readers who want to be immortal should type in the following program:

```
100 PAPER 0
110 INK 6
120 CLS
130 CSIZE 3, 1
140 AT 4, 1
150 PRINT "BJ, The Return, is loading".
160 CLOSE #1:CLOSE #2:CLOSE #0
170 LBYTES mdv1_CDS, 200000
180 EXEC_W mdv1_PRc
190 D=PEEK_L (163872)
200 E=RESPR (D-189574)
210 LBYTES mdv1_CD, 189574
220 POKE=W 199450, 16890
230 CALL 189574
```

then RUN it with a copy of BJ The Return in mdv1_. Enter the security codes as usual and when it has loaded you will have infinite lives.

Peter Dampier,
Brighton, Sussex.

Accentuated Quill

Having slaved away putting all the accents into a 3,000-word article in French, I found to my horror that my printer, a Centronics GLP, uses a completely different code for accented letters. I shall have to send my publisher a copy with the accents added by hand, or ask my wife to produce it on her typewriter. She is a French touch-typist and refuses to touch Quill until it can offer her an AZERTY keyboard.

Philip Stewart,
Boars Hill, Oxford.

Editor's reply: If you can discover which code the GLP uses for the accents you require the translate command in the printer driver can be used to make the alteration.

Long letter

It was good to receive my June *Sinclair QL World* and to find some sympathy in an article describing the loss of files due to "I/O incomplete" or "invalid Quill file" types of error messages.

With my JM VER$ QL, I have not been able to save any documents longer than about 5,650 words or 64 sectors. In your Open Channel was a letter from Ian Tait suggesting that he could store files on Microdrive up to 10,000 words in length. I am asking how that is so, in the light of my system's limitation. Could someone please explain how he can reach that great length?

Incidentally, I have a PCML 256K memory add-on and have never had any real problem with my system. I am interested in any information or letters from anyone knowing a little more about this "cute" kind of storage system.

Rois Harder #15,
P O Box 491, Yanbu,
K. of Saudi Arabia.

Magnetise your Microdrives

I have possessed a QL from its launch – give or take a few months – and find it an excellent machine but I had accumulated several corrupted Microdrives which the computer refused to acknowledge existed. After persistent attempts to re-format the cartridges, always met with the response 'not found', I was about to give up in despair. Having dissected one cartridge, with great pleasure, I hit on the significance of the phrase magnetic medium and decided to try a magnet on the offending Microdrives – and it worked.

I rubbed the magnet on the piece of exposed tape and after two or three tries, presumably to find the correct area of tape, the Microdrive gave in and was formatted. Is the humble magnet the answer to all our Microdrive problems?

George Coutts,
Fleet, Hampshire.

Hardware headache

I am a Belgian reader of your magazine for which I congratulate you. I am the owner of two Sinclair QLs – a JM and a JS – fitted with Sandy 512K RAM-board and CST disc interface plus twin 3.5in. drives from the same. This system alone worked perfectly until I purchased a Toolkit II EPROM from Care Electronics and wanted to fit it into the QL ROM port.

On power-up, the CST logo appears on screen then the Care Toolkit one and finally the normal F1/F2 choice. Until there, everything is satisfactory. The problems arise when I try to use the additional commands like WCOPY. That causes the disc or Microdrive accessed to run and whirr for ever and locks-up the QL until general RESET. The same kind of phenomenon appears when using the ICE EPROM from Eidersoft in its back-up command.

None of the problems is present when the QL is used with only one interface – CST or Sandy – and the EPROM. It occurs only when the two interfaces are in place together with the EPROM, on JS as well as on JM.

I read the manual of each one of the devices carefully to find an explanation to the troubles but no answer could be found. I also tried the TK2_EXT command from Toolkit II to make sure the new commands were linked correctly but once again with no result.

I am now thinking about replacing the combination of CST and Sandy cards with a single new Sandy SuperQboard which houses both disc interface and half-megabyte RAM but can it be a solution?

That is why I decided to write hoping you can help me find how to use my complete system. If not, you can always copy my paper in your magazine for your readers to be informed about the troubles they could encounter in such a hardware situation.

Pierre Cornez,
Hyon, Belgium.

Amstrad aggravation

I bought my QL last November. Each time I switched on the machine, it seemed to take longer for the colour to appear. Now finally the colour has failed altogether. In view of the recent Amstrad takeover I enquired at Wigfalls what the procedure is to have the machine repaired under warranty.

The manager investigated and reported to me that Amstrad has not yet set up any maintainance facilities for Sinclair products and that any goods returned on warranty for repair products and that any goods returned on warranty for repair would be "frozen" until such time as it is prepared to effect the necessary set-up.

Obviously, I am not very eager to lose my QL for an indefinite period. On the other hand, I am concerned about the remaining warranty time.

I dread the prospect of losing it for any length of time. If you could advise me as to my best course, I would be grateful.

P. Kidson,
Smethwick,
West Midlands.

TOOLKIT

The battle of the ROMs is over; the final tally is three working but uncompleted versions of the QL operating system. While for most of us that will have little or no practical meaning, serious programmers have long since discovered that Qdos does not yet offer all the necessary features of an advanced working environment expected of a machine with the processing power of the QL.

Recognising the genuine need for correcting the omissions to the existing Qdos versions, Tony Tebby wrote a collection of procedures and functions which was offered originally to SRL almost two years ago for inclusion in eventual upgrades of the QL ROM.

Superseded versions of the JS ROM which should have appeared in the first quarter of 1985, in common with many of the other good ideas surrounding evolution of the QL, failed to materialise. Rather than letting the concept of the improvements formulated for the QL slide into oblivion, QL-Toolkit was made available initially on Microdrive.

Although the early Toolkit was extremely difficult to obtain, its main disadvantage was that, available only on Microdrive, its use reduced the amount of available RAM. Tebby's new *Toolkit II,* presented as a 16K plug-in ROM cartridge, is marketed in the U.K. by Care Electronics. Incorporating many new procedures and functions, this powerful tool has been revised and enlarged to the extent of being almost entirely re-written.

Supporting and clarifying the QL command structure, the extensions offered by Toolkit II provide a range of facilities which, in many ways, simplify operation and may be grouped into several broad categories.

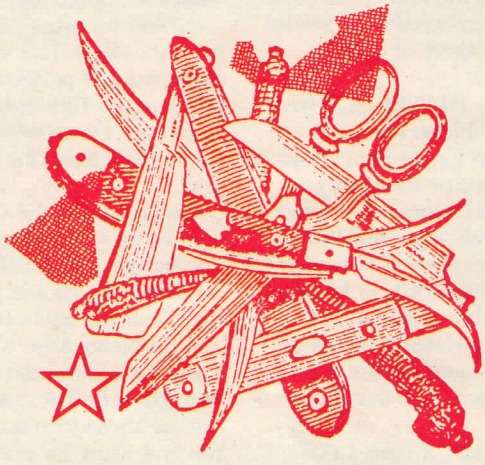
File editing. The main shortcoming of the QL editing facility is the restriction of having only a line editor. Also dedicated programs, such as screen editors, have been required to view and edit text files.

The Toolkit II's new command, ED, permits direct screen editing in a listing while VIEW provides a facility for the viewing of text files. While in the ED mode, listings are indented from their line numbers and lines being edited are highlighted. Successive line numbers are generated automatically which are halfway, where possible, between existing line numbers.

Providing two modes of operation, ED may be used in either insert mode, where additions are made to a line, pushing along existing characters, or in over-write mode, where successive characters are deleted. In common with all good editors, a range of keys is available for screen and text management. Three drive extensions have been added to the operating system – RENAME, TRUNCATE and FLUSH.

File maintainance. Since file systems are of major importance to any computer system, many Toolkit II commands tend to concentrate on methods which improve file-handling and, at the same time, extend the range of filing procedures available to the user.

A number of commands have been added to the existing DIR, COPY and DELETE facilities which increase the versatility of the QL manipulation of files. Some of the most notably the wildcard commands, extract file information in an organised manner and can be applied to directories, copying, spooling and renaming.

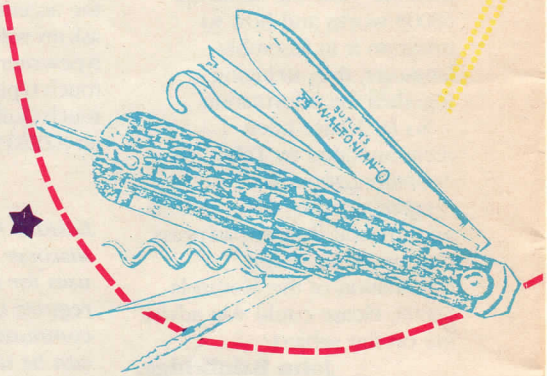


Any of the commands beginning with w may be used almost interchangeably with the original commands but the additional command power becomes evident when particular files are selected by parts of their names. When listed, directories, for example, will include all the files containing similar character combinations.

Copying files with wildcard names such as wcopy_fred, illustrating only one possible permutation, will provide the option of copying all files containing the name fred from the default device, which can be re-defined by the DATA_USE command to another default device, which can also be re-defined.

Initially, the first file name is sent to the screen, followed by Y/N/A/Q, from which it is possible to set the system so that it will perform the required action on it, to skip a particular file, perform the required action on all similar files or to quit the command. The latest version of Toolkit II offers the facility of supporting the system break after initiating a W command.

Additional commands to copy structuring include COPY_O and COPY_H which provide the facility for copying over existing files and copying a pure byte serial link so that the communications software will know in advance the length of a file respectively.



The_OVER commands, incidentally, are particularly useful for updating file information continually during program development as well as saving. New OPEN and CLOSE commands have been added to the range of keywords for improved file-handling which differ from the standard commands in two ways. If a file error, such as 'not found' occurs, the new functions will return the error code and continue and those functions may be used to find a vacant hole in the channel table; if successful, it will return the channel number.

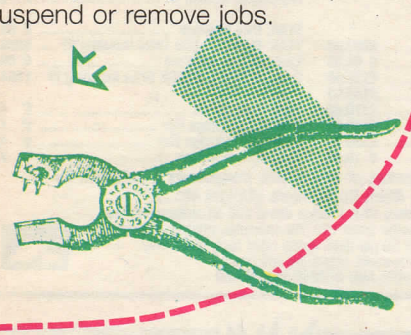
Directory control. Expecting to operate in a multi-device environment – i.e., mdv1 and 2/flp1 and 2 – in addition to the WDIR facilities, Toolkit II supports the additional commands of DATA_USE, PROG_USE, DEST_USE which set the defaults from and to which information flows. Devices are defined as any legitimate QL device such as flp, mdv, ser and so on.

The DLIST command will return a listing of the _USE defaults or assignments. In common with the standard DIR command, which is supported for compatibility, directory listings may be sent to any open channel.

Run-time commands. Toolkit II redefines and extends file loading and saving operations so that default directories are used. That means that if the DATA_USE device is mdv, it is necessary only to type lrun name and the file will be obtained from mdv1_. In addition to LRUN, LRESPR is available for loading a file into a resident procedure area and calling it.

The input of EXEC and EXEC_W has been shortened, to EX and EW respectively, but may be used interchangeably. An additional command, ET, has been added which will set up a program and return control to SuperBasic so that a debugger can be called to trace its execution.

Keywords, related to the various aspects of the job flow, have been included in the new operating system which can provide a list of all jobs currently running, find or set priorities, suspend or remove jobs.

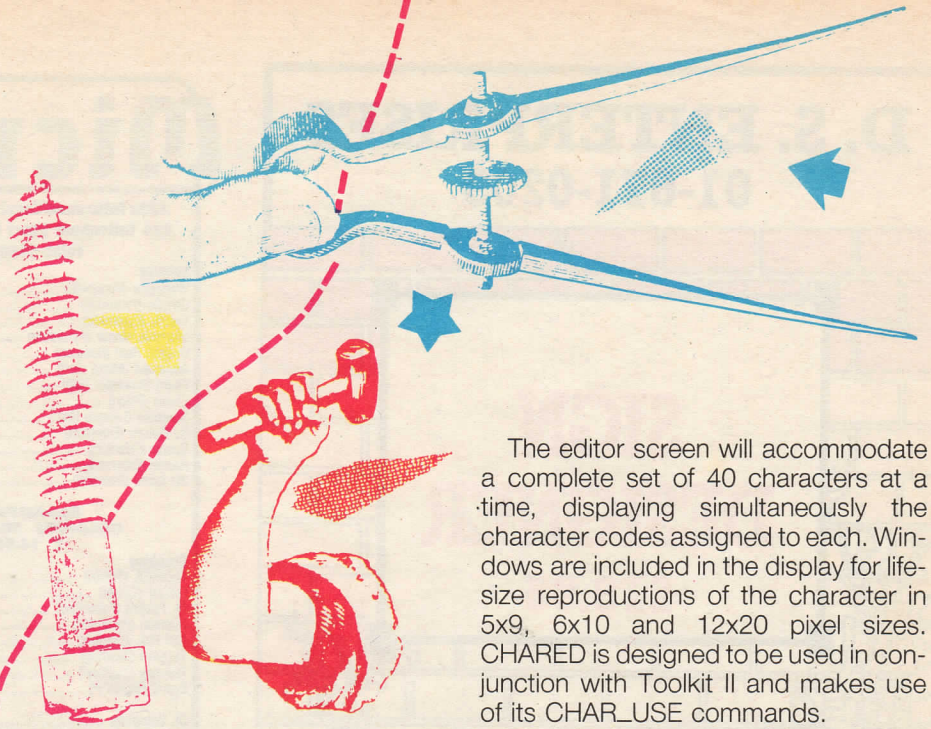


Miscellanea. Many other procedures and functions included in the Toolkit II repertoire extend the usefulness of the QL; some of them, like the Network driver, raise many of the rudimentary and largely unfinished features of the QL network facility to a useful level. Toolkit II documentation, however, points out one rather sad fact – a significant number of pre-D14 QLs have Network hardware which does not work at all.

For those fortunate enough to have a working Network system, Toolkit II incorporates an extended file server which includes serial device (printer) serving, as well as QL to QL messaging.

The NFS_USE command has been altered to give more flexibility whereby, as just one example, several users may share a data disc when using Quill, Archive or any other similar program. Other utilities include the inevitable clock facility, which is available on-screen by using the CLOCK keyword. More useful is the facility for an alarm/reminder, initiated by ALARM, followed by the hour and minutes required.

Error-handling, initiated with the largely unfinished code contained in the JS and MG ROMs has, as far as possible, been implemented. If anyone has compiled documentation regarding the JS error traps, i.e., ERR_NC, and so on I would appreciate receiving a copy.



Two powerful extensions have been included in the latest version of Toolkit II; <ALT>&<ENTER> will get back the last line typed (to #0), and it is now possible to assign character strings to various keys by the use of ALTKEY and <key>, followed by the string command.

There are two commands which will force a return to the turn-on windowing WTV and WMON. Other display controls include commands to enable or disable the cursor, setting the character fonts and positioning the cursor in pixel increments.

Other facilities have been implemented for the option of fixed format I/O. Initiated by PRINT_USING, followed by the required format – which contains a template of the required output – and items to print, fixed-formats may be utilised in screen displays or hard copy.

A catalogue of the additional commands available is provided by Toolkit II – a feature also consistent with the majority of the newer disc interfaces and expansion units which include a toolkit – by typing EXTRAS. <CTRL> & <F5> (pause) is generated for directory and view returns when a screen capacity has been reached.

Taking advantage of the additional power provided by Toolkit II, a new program released by Care Electronics and written by Colin Opie, CHARED, is a powerful utility for producing a range of custom fonts, icons and symbols.

Supplied on Microdrive cartridge, the program includes two editor versions, one configured for use with disc, the other for use with Microdrive – a SuperBasic demonstration program illustrating graphically the application of the fonts, and nine pre-defined character sets, one of which is an animation font.

The editor screen will accommodate a complete set of 40 characters at a time, displaying simultaneously the character codes assigned to each. Windows are included in the display for life-size reproductions of the character in 5x9, 6x10 and 12x20 pixel sizes. CHARED is designed to be used in conjunction with Toolkit II and makes use of its CHAR_USE commands.

That the importance of the additions to the QL operating system have been taken seriously can be verified by the fact that the majority of the better disc interfaces, with or without memory expansion, include an abbreviated version of Toolkit II, utilising mainly the file-handling improvements.

Future developments of Toolkit II will almost certainly have only minor refinements to the already outstanding features achieved. While Toolkit is available only as an add-on for the present QL, the soon-to-be-released derivatives – the Thor, Tebby's QLT and others – will probably have the Toolkit incorporated as part of their integral operating systems.

With that in mind, it might be worthwhile to point out that there are only a few programs which use some of the keywords, reserved by Toolkit, for their own purpose and so conflict with Toolkit II functions. When one software house was approached by the writer about the problem, the only suggestion offered was "to pull out the ROM" – something like that.

When the idea of being prepared for compatibility with future versions of Qdos-based machines was suggested as being worth consideration, the response was a resounding pause, so we have to wait and see.

In addition to an already excellent product, I was impressed with the very good documentation. Underlining the attention of Care to fine marketing details, Toolkit II is supplied complete with a rack for storing up to six other ROMs.

Looking at the superb features offered by Toolkit II in terms of it not having been included as an integral part of the QL operating system as long ago as early 1985, one cannot help but be reminded about the old adage concerning a ha'p'worth of tar.

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QL Storage *from* CST

QDISC

Now containing the complete QL Toolkit software as well as an easily used Ram-Drive device driver, the CST QDisc is the longest established and most widely used floppy disc controller for the QL computer. The QDisc interface may be used with virtually any 3.5" or 5.25" floppy disc drives including, of course, CST's dual slim-line 720K (1 Megabyte unformatted) high performance, 80 track double sided drives. The Toolkit software provides a wide range of SuperBASIC commands and functions designed to allow the full power of the QL to be realised without resorting to machine code programming, giving access to job control, random access I/O, character sets, wild card file handling and so on. The Toolkit is included in the QDisc firmware, so it is ready for use as soon as the system is switched on, as is the Ram-drive device driver, which allows any unused memory to be used as a high speed storage medium, ideal for temporary results, and for saving screen images for high speed displays. Naturally the Ram-drive may be used to maximum advantage when used on a QL with additional memory such as the RAM-plus.

RAM plus

Expanding the QL's memory from 128K to the maximum 640K, the CST RAM-plus is based on the latest 256K DRAMs to give full speed no wait-state operation and is housed in an elegant aluminium case which matches the QL and provides an expansion port allowing a peripheral interface, such as a QDisc floppy or Winchester controller to be plugged in. Adding high speed memory to the QL has several advantages: all QL programs run faster, including ones that make heavy use of disc or microdrive as QDos uses spare memory for buffering data; increased data space is available for SuperBASIC, Psion and other application packages and the QL's multitasking ability is greatly enhanced by the ability to load several large programs simultaneously. The extra memory can also be used to advantage with the Ram-drive firmware supplied with the QDisc. For customers who have already purchased an earlier QDisc controller, the Ram-drive software can be supplied on floppy disc at a small charge.

20MBytes!

The flagship of the CST fleet of storage devices for the QL is the 20 Megabyte Winchester drive with integral floppy drive. The system is housed in a compact metal case with integral power supply and is interfaced to the QL by a small controller card. The floppy specification is the same as the standard QDisc; the Winchester is a high performance drive unit based on the new SCSI standard, which allows up to eight drives to be connected to one QL (available to special order). The Winchester firmware is fully compatible with standard microdrive and floppy QDos drivers, and also supports heirarchical directories and file date stamping. The directory structure allows files to be separated into compartments; for example, programs can be held in one directory while data for various projects can be held in other directories. This is essential when a disc can hold over 1000 files! Date stamping of files is used to keep a record of the last time every file on the Winchester was accessed, modified or backed up. This allows the Data Management Utility supplied with the system to archive only those files which have been changed since the last backup was performed. This greatly reduces the time taken to perform regular backups.

CST

Cambridge Systems Technology
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TECHNICAL

Each month our QL technical expert, Colin Opie, will sort through the mailbag and provide the answer to your programming problems.

Evaluating the QL

Recently while writing a graph-plotting program in SuperBasic I had a problem. I wanted to be able to type-in an equation at the keyboard and then use that equation to plot its graph.

The problem called for the use of a VAL function – or EVAL in BBC Basic – which the QL does not support fully. Coercion works if the VALue of a string is just a number but not if it is a string such as 'SIN (0.5)'. So can anyone provide a DEF FUNCtion to perform the VAL function as found on Spectrum and Amstrad computers?

Mark Pepper,
Preston, Lancs.

There are three main ways in which an EVAL function can be added to SuperBasic. Probably the best method would be to write the function in assembly language and add the ensuing machine code to the SuperBasic list of known functions. The EVAL function would need to have a string passed over to it which held the right-hand side of the equation. A fair degree of parsing would then have to occur to split the string into constants, operators – arithmetic or otherwise – and variables. At that point the SuperBasic name table may need accessing to find the current values of any variables. Finally, the appropriate mathematical operations would be carried-out and a floating point result returned by the function.

At assembly language level there are two SuperBasic utility calls of particular use in implementing such an EVAL function. They are RI.EXEC (vector $11C) and RI.EXECB (vector $11E). The first will execute a single arithmetic operation and the latter will execute a specified list of operations. In practice, that means that you do not need to write your own sine or tangent operations – you can use the ones supplied by SuperBasic. For more information you could consult the *Advanced User Guide* or the book QL *Assembly Language Programming* published by McGraw-Hill.

Despite this being the best overall solution, it will be time-consuming to implement and it will require some expertise in parsing techniques and assembly language programming.

Another approach is to write the function in SuperBasic. You will still need to split the string expression into its constituent parts and you will still need to know how to analyse the expression to be able to evaluate it correctly. The function will be much easier to debug and the execution of mathematical operations and the grabbing of current values for variables will be performed naturally by SuperBasic.

The main problems with the SuperBasic solution are memory requirements and speed. To perform the tokenising of the string expression, and the eventual evaluation of it, a number of arrays will have to be set up. The size of those arrays will dictate how complex the expression may be before we run out of space. Persistent access to array structures takes time. If you wish to display, say, 500 points across the screen, you could wait a long time to see the results, perhaps as long as 25-30 seconds or even longer.

A third solution is possible, provided the computer system will allow the merging of programs during the execution of the current program in memory. Hence the solution is viable so far as the QL is concerned. The program listing shown is a very simple demonstration of this method for obtaining an EVAL function: function.

```
100 REMark Simple
    Solution to EVAL using
110 REMark file merging.
120 :
130 REMARK Clear screen
    & set file name
140 WINDOW 512,256,0,0:
    PAPER 0:CLS
145 fyl$='mdv1_f2x'
150 :
160 REMark Main program
180 axis: get_expr:INK 4
185 MRUN fyl$:DELETE fyl$
187 POINT -3,eval(1-3)
190 FOR M=-3 TO 3 STEP
    3E-2
200 LINE TO m,eval (m)
210 END FOR m
220 PRINT#0, 'Any key to
    continue . . ';
IF INKEY$ (#0,-1)= ' ' :GO
  TO 230: END IF
240 GO TO 180
250 :
260 DEFine PROCedure
    axis
280 WINDOW
    448,200,32,16: BORDER
    #0,1,4
290 CLS#0:CLS:INK#0,7:
    INK 7
295 SCALE 4, -3.25,-2
300 LINE -3,0 to 3,0:LINE
    0, -2 TO 0,2
310 FOR b=-3 TO 3
320 LINE b,-5E-2 TO b,0
30 LINE 0,b TO 8E-2,b
340 END FOR b
350 AT 0,1: INK 2:PRINT
    'Each division = 1'
355 AT 0,57: PRINT 'Centre
    is (0,0)'
360 END DEFine
370 :
900 DEFine PROCedure
    get_expr
910 PRINT#0, 'y = ';:
    INPUT #0.f$
912 OPEN NEW#3,fyl$
912 OPEN_NEW#3, fyl$
915 PRINT#3, '940
    RETurn ';f$
920 CLOSE#3
925 END DEFine
930 :
935 DEFine FuNction eval
    (x)
940 RETurn SIN (x)
945 END DEFine
```

Figure 1. Simple implementation of EVAL using merging.

In line 145 we have set up the name for the expression file we shall use. You may use any name you wish and the overall speed of response will be better from disc devices. If your machine supports RAM-discs, they would be the most obvious device to use.

Lines 160 to 240 comprise the main program. All we are doing is setting-up a screen display with some axis, collecting an expression, and displaying the result. The procedure GET_EXPR is the important one. it displays the left-hand side of the expression as 'y=' and expects you to enter the right-hand side. For reasons which will soon become apparent the side we type-in must contain the variable 'x'. GET_EXPR places the string '940 RETurn' in front of our string input, writes out the whole lot to our expression file, and returns to the main program. The main program, at line 185, then merges this expression file with the current program, deletes the now superfluous file, and drops into the FOR loop which will display the graphical presentation of the expression.

The important point is that when the expression file was merged into the current program, line 940 was changed to reflect the expression required. When the function EVAL is called from within the FOR loop, clearly the new expression line will be used for evaluation purposes.

There are, however, some points which need watching. First, if you re-number the program you will also need to change the procedure GET_EXPR so that it writes-out the correct line number to merge. A less obvious point relates to the restrictions imposed on the merge facility in SuperBasic. You may not have an MRUN statement inside a subroutine, procedure or function body. If you do, the program will fail at the end of the subprogram body, because MRUN causes the SuperBasic return stack to be cleared. That is why our main program is not a procedure in its own right and also why we are using a GOTO at line 240 instead of making the main program one big REPeat loop.

The program is relatively basic in its current state but you could build on it very easily. You could add procedures to allow the axis and their scales to be changed, or to permit parabolic type expressions by having different versions of the GET_EXPR and EVAL procedures.

To see the demonstration program in action try the following right-hand sides:
a) sin(x) b)sin(x)*cos(21x)
c) x+1n(abs(x))
d) sin(x) + sin(3*x)/3

HELPLINE

If you have a technical problem you would like solved, write to: Technical Helpline, Sinclair QL World, 79–80 Petty France, London SW1H 9ED

+ sin(7*x)/7
e) sin(10*x) + 0.2*cos(8*x) – 0.2*cos(12*x)
Example d shows how sine waves can be added to make approximations to a square wave, as in Fourier analysis. Example e is what is known as a modulated waveform. Such waveforms are used in, for example, radio communications. When trying your own expressions, be careful not to make a syntactical error or SuperBasic will complain. Also be careful not to try to perform illegal operations, for example by trying to take the square root of a negative number. If you use the Tony Tebby/Care *Super Toolkit II* ROM, you could use the error-trapping facilities afforded by this ROM to improve the stability of the program.

Memory recall

With reference to N.J. Lennon's letter in the March 1985 edition of *QL User*, it appears that if you load a program into memory then type NEW or load another program, on reloading the same program the QL accesses the Microdrives for a very short time. It then hangs up for a short time before returning the cursor.

I have reason to believe that during this hand-up process, the QL is scanning all the QL memory area, attempting to find the program and then to recover it. I am not a very good machine code programmer but I believe that there is a Qdos function somewhere which must be able to recall programs in memory. I hope some machine code genius can write a program to enable recovery of such programs which are floating in memory. Also if several RESPR commands are given, then to find the base of one of the commands, do you type PRINT RESPR(variable) or PRINT RESPR(0)?

I think I read somewhere that PRINT RESPR(0) prints the base of all reserved memory. Also is there any SuperBasic command which will release any memory reserved using RESPR to Qdos and SuperBasic?

N. Kasrawy, London NW3.

There are a number of points of interest here and they can all be discussed under the general title of QL Memory Management. Regardless of how much RAM your particular QL has, Qdos – the QL operating system – splits available memory into six main regions.

At the top of available RAM there are the Resident Procedures. They are procedures, as the name suggests, which are to remain resident in the system for as long as the computer is switched on. Whenever you use a program which creates command extensions to SuperBasic, this region will be used. Within SuperBasic we can grab a block of resident procedure space for our own use by using a RESPR statement of the form:

myspace=RESPR (2000)

That example will reserve 2,000 bytes of storage and return the base address of the reserved block, which we have assigned to the variable 'myspace'.

If we were to enter the command 'PRINT RESPR (0)', we would be supplied with the current base of the resident procedure area and zero bytes will have been reserved, so the region's base address as given will still be correct.

There is no standard procedure for reclaiming resident procedure memory because that would be contrary to the purpose for this area in the first place. Although, theoretically, you could go poking around changing the system varible SV_RESPR so that it had the same value as SV_RAMT, the idea is alien to correct use of the QL memory. Finding the base of a number of reserved areas is easy – you were told of the base addresses when you first allocated the space. Make sure you use different variables for each RESPR call if you really need to have sesparate areas and need to remember the base address of each of them.

Between the SuperBasic region and the true 'free memory' region, Qdos allocates a certain amount of RAM to Filing Subsystem Slave Blocks. Those blocks contain copies of sectors loaded from or saved to an attached device during previous I/O operations. How many slave blocks are allocated will depend on how much memory your system has. The effect can be seen clearly when using add-on RAM. If you have a 256K extension RAM you will notice that on, say, using Archive, you do not gain an extra 256K of user space. Why? Because Qdos has seized the opportunity to grab a few more slave blocks.

Those slave blocks have an effect on how much a device needs to be accessed. Suppose we load a SuperBasic program from a Microdrive cartridge. Initially the Microdrive is accessed for a relatively long period. If we ask for the same program to be loaded again, Qdos checks that the Microdrive has not been changed – in case you have two different programs on different cartridges but with the same name – and then enters its load routine. Assuming the cartridge has not been changed there is every possibility that RAM slave blocks will contain the same data as the sectors on the cartridge. If that is the case, Qdos will collect the data from the slave blocks by preference.

When a SuperBasic program is loaded into memory it is translated into internal format, which speeds program execution. It is immaterial whether the program is from slave blocks or from a physical cartridge; the translation work still has to be done. That is why there is a delay before the cursor returns. Program text is being collected from the slave block region, translate as normal, and entered into the SuperBasic region. Qdos is an extremely versatile and clever operating system and the delay is certainly not due to it meddling about in memory trying to find a lost program.

Memory usage:
1. SV_RAMT $(top of RAM)
2. SV_RESPR
3. SV_TRANSP
4. SV_BASIC
5. SV_FREE
6. SV_HEAP
$28000

1. Resident Proc Area
2. Transient Progs (EXEC'd QL jobs)
3. Super_BASIC Area
4. Filing system slave blocks
5. Channels and common heap
6. System tables & vars.

The six main memory blocks corresponding to the system variables above.

Pin problem

With reference to the QL User Guide Section Concepts page 12 RS232C, can someone inform me how the pins are numbered on the telephone jack? Is pin 1 or pin 6 at the catch release side of the telephone-type jack. The information is required for connecting a Canon electronic typewriter as a printer.

J. E. Cowper, Stourport-on-Severn Worcs.

Pin 6 is at the catch release side, giving you the following pin-outs:

PIN	SER1	SER2
1	Signal GND	Signal GND
	Signal IN	Signal OUT
3	Signal OUT	Signal IN
4	Ready IN	Ready OUT
5	Ready OUT	Ready IN
6	+12 volts	+12 volts

The BT reference numbers for the plug required are 631A or 631W.

SPECTRUM SIMULATION

Marcus Jeffrey provides the final part of the machine code program from last month and shows how to set up an attributes file and user defined graphics.

The Spectrum attributes file contains information on the paper and ink colours of a particular character square. They are held in the byte format:

f b ppp iii

where:
- f – Set if flashing.
- b – Set if bright.
- ppp - Paper colour (0 to 7).
- iii – Ink colour (0 to 7).

The attribute code for the character in a particular position can be accessed with the command:
ATTR(line,column)

In our four-colour mode the QL cannot have flashing characters – unless we went to the trouble of inverting the appropriate bits on interrupts – or bright characters, so we are concerned only with the bottom six bits. That is handled easily from SuperBasic, using the short function SATTR, shown in figure two. The variable start is assumed to be the location at which the code was loaded and should be global throughout the program.

Finally, an oft-used Spectrum feature is User-Defined Graphics. In the Spectrum, it is an area of RAM which is used as an extension to the ordinary character set and thus can be POKEd by the user to produce special characters. The Spectrum Block graphic characters have already been defined in our new 8 x 8 pixel font and they can be seen by printing the codes from1 28 to 143, something along the lines:
FOR i = 128 TO 143:SPRINT CHR$(i);
should suffice.

Figure 2.

```
1000 DEFine FuNction SATTR (row,col)
1010 LOCal attributes,offset
1020      attributes = start + 570
1030      offset     = 32 * row + col
1040      RETurn PEEK
     (attributes+offset) && 63
1050 END DEFine SATTR
```

To poke the user-defined graphics, the Spectrum has a command USR which is followed by a lower-case letter in the range 'a' to 'u'. That returns the appropriate address and the new character codes are then POKEd into it and the following seven byte locations.

Listing 1. Continued from July Issue.

LOC	OBJECT	STMT	SOURCE STATEMENT	
052A'	0010 2810 2A44 3A00	211	DC.B $00,$10,$28,$10,$2A,$44,$3A,$00	&
0532'	0008 1000 0000 0000	212	DC.B $00,$08,$10,$00,$00,$00,$00,$00	'
053A'	0004 0808 0808 0400	213	DC.B $00,$04,$08,$08,$08,$08,$04,$00	(
0542'	0020 1010 1010 2000	214	DC.B $00,$20,$10,$10,$10,$10,$20,$00	)
054A'	0000 1408 3E08 1400	215	DC.B $00,$00,$14,$08,$3E,$08,$14,$00	*
0552'	0000 0808 3E08 0800	216	DC.B $00,$00,$08,$08,$3E,$08,$08,$00	+
055A'	0000 0000 0008 0810	217	DC.B $00,$00,$00,$00,$00,$08,$08,$10	,
0562'	0000 0000 3E00 0000	218	DC.B $00,$00,$00,$00,$3E,$00,$00,$00	-
056A'	0000 0000 0018 1800	219	DC.B $00,$00,$00,$00,$00,$18,$18,$00	.
0572'	0000 0204 0810 2000	220	DC.B $00,$00,$02,$04,$08,$10,$20,$00	/
057A'	003C 464A 5262 3C00	221	DC.B $00,$3C,$46,$4A,$52,$62,$3C,$00	0
0582'	0018 2808 0808 3E00	222	DC.B $00,$18,$28,$08,$08,$08,$3E,$00	1
058A'	003C 4202 3C40 7E00	223	DC.B $00,$3C,$42,$02,$3C,$40,$7E,$00	2
0592'	003C 420C 0242 3C00	224	DC.B $00,$3C,$42,$0C,$02,$42,$3C,$00	3
059A'	0008 1828 487E 0800	225	DC.B $00,$08,$18,$28,$48,$7E,$08,$00	4
05A2'	007E 407C 0242 3C00	226	DC.B $00,$7E,$40,$7C,$02,$42,$3C,$00	5
05AA'	003C 407C 4242 3C00	227	DC.B $00,$3C,$40,$7C,$42,$42,$3C,$00	6
05B2'	007E 0204 0810 1000	228	DC.B $00,$7E,$02,$04,$08,$10,$10,$00	7
05BA'	003C 423C 4242 3C00	229	DC.B $00,$3C,$42,$3C,$42,$42,$3C,$00	8
05C2'	003C 4242 3E02 3C00	230	DC.B $00,$3C,$42,$42,$3E,$02,$3C,$00	9
05CA'	0000 0010 0000 1000	231	DC.B $00,$00,$00,$10,$00,$00,$10,$00	:
05D2'	0000 1000 0010 1020	232	DC.B $00,$00,$10,$00,$00,$10,$10,$20	;
05DA'	0000 0408 1008 0400	233	DC.B $00,$00,$04,$08,$10,$08,$04,$00	<
05E2'	0000 003E 003E 0000	234	DC.B $00,$00,$00,$3E,$00,$3E,$00,$00	=
05EA'	0000 1008 0408 1000	235	DC.B $00,$00,$10,$08,$04,$08,$10,$00	>
05F2'	003C 4204 0800 0800	236	DC.B $00,$3C,$42,$04,$08,$00,$08,$00	?
05FA'	003C 4A56 5E40 3C00	237	DC.B $00,$3C,$4A,$56,$5E,$40,$3C,$00	@
0602'	003C 4242 7E42 4200	238	DC.B $00,$3C,$42,$42,$7E,$42,$42,$00	A
060A'	007C 427C 4242 7C00	239	DC.B $00,$7C,$42,$7C,$42,$42,$7C,$00	B
0612'	003C 4240 4042 3C00	240	DC.B $00,$3C,$42,$40,$40,$42,$3C,$00	C
061A'	0078 4442 4244 7800	241	DC.B $00,$78,$44,$42,$42,$44,$78,$00	D
0622'	007E 407C 4040 7E00	242	DC.B $00,$7E,$40,$7C,$40,$40,$7E,$00	E
062A'	007E 407C 4040 4000	243	DC.B $00,$7E,$40,$7C,$40,$40,$40,$00	F
0632'	003C 4240 4E42 3C00	244	DC.B $00,$3C,$42,$40,$4E,$42,$3C,$00	G
063A'	0042 427E 4242 4200	245	DC.B $00,$42,$42,$7E,$42,$42,$42,$00	H
0642'	003E 0808 0808 3E00	246	DC.B $00,$3E,$08,$08,$08,$08,$3E,$00	I
064A'	0002 0202 4242 3C00	247	DC.B $00,$02,$02,$02,$42,$42,$3C,$00	J
0652'	0044 4870 4844 4200	248	DC.B $00,$44,$48,$70,$48,$44,$42,$00	K
065A'	0040 4040 4040 7E00	249	DC.B $00,$40,$40,$40,$40,$40,$7E,$00	L
0662'	0042 665A 4242 4200	250	DC.B $00,$42,$66,$5A,$42,$42,$42,$00	M
066A'	0042 6252 4A46 4200	251	DC.B $00,$42,$62,$52,$4A,$46,$42,$00	N
0672'	003C 4242 4242 3C00	252	DC.B $00,$3C,$42,$42,$42,$42,$3C,$00	O
067A'	007C 4242 7C40 4000	253	DC.B $00,$7C,$42,$42,$7C,$40,$40,$00	P
0682'	003C 4242 524A 3C00	254	DC.B $00,$3C,$42,$42,$52,$4A,$3C,$00	Q
068A'	007C 4242 7C44 4200	255	DC.B $00,$7C,$42,$42,$7C,$44,$42,$00	R
0692'	003C 403C 0242 3C00	256	DC.B $00,$3C,$40,$3C,$02,$42,$3C,$00	S
069A'	00FE 1010 1010 1000	257	DC.B $00,$FE,$10,$10,$10,$10,$10,$00	T
06A2'	0042 4242 4242 3C00	258	DC.B $00,$42,$42,$42,$42,$42,$3C,$00	U
06AA'	0042 4242 4224 1800	259	DC.B $00,$42,$42,$42,$42,$24,$18,$00	V
06B2'	0042 4242 425A 2400	260	DC.B $00,$42,$42,$42,$42,$5A,$24,$00	W
06BA'	0042 2418 1824 4200	261	DC.B $00,$42,$24,$18,$18,$24,$42,$00	X
06C2'	0082 4428 1010 1000	262	DC.B $00,$82,$44,$28,$10,$10,$10,$00	Y
06CA'	007E 0408 1020 7E00	263	DC.B $00,$7E,$04,$08,$10,$20,$7E,$00	Z
06D2'	000E 0808 0808 0E00	264	DC.B $00,$0E,$08,$08,$08,$08,$0E,$00	[
06DA'	0000 4020 1008 0400	265	DC.B $00,$00,$40,$20,$10,$08,$04,$00	\
06E2'	0070 1010 1010 7000	266	DC.B $00,$70,$10,$10,$10,$10,$70,$00	]
06EA'	0010 3854 1010 1000	267	DC.B $00,$10,$38,$54,$10,$10,$10,$00	Up-arrow
06F2'	0000 0000 0000 00FF	268	DC.B $00,$00,$00,$00,$00,$00,$00,$FF	_
06FA'	001C 2278 2020 7E00	269	DC.B $00,$1C,$22,$78,$20,$20,$7E,$00	Pound sign
0702'	0000 3804 3C44 3C00	270	DC.B $00,$00,$38,$04,$3C,$44,$3C,$00	a
070A'	0020 203C 2222 3C00	271	DC.B $00,$20,$20,$3C,$22,$22,$3C,$00	b
0712'	0000 1C20 2020 1C00	272	DC.B $00,$00,$1C,$20,$20,$20,$1C,$00	c
071A'	0004 043C 4444 3C00	273	DC.B $00,$04,$04,$3C,$44,$44,$3C,$00	d
0722'	0000 3844 7840 3C00	274	DC.B $00,$00,$38,$44,$78,$40,$3C,$00	e
072A'	000C 1018 1010 1000	275	DC.B $00,$0C,$10,$18,$10,$10,$10,$00	f
0732'	0000 3C44 443C 0438	276	DC.B $00,$00,$3C,$44,$44,$3C,$04,$38	g
073A'	0040 4078 4444 4400	277	DC.B $00,$40,$40,$78,$44,$44,$44,$00	h
0742'	0010 0030 1010 3800	278	DC.B $00,$10,$00,$30,$10,$10,$38,$00	i
074A'	0004 0004 0404 2418	279	DC.B $00,$04,$00,$04,$04,$04,$24,$18	j
0752'	0020 2830 3028 2400	280	DC.B $00,$20,$28,$30,$30,$28,$24,$00	k
075A'	0010 1010 1010 0C00	281	DC.B $00,$10,$10,$10,$10,$10,$0C,$00	l
0762'	0000 6854 5454 5400	282	DC.B $00,$00,$68,$54,$54,$54,$54,$00	m

That again can be handled by a short SuperBasic procedure, as shown in figure three. Using this procedure, a few simple lines such as:

```
FOR i = SUSR("a") TO SUSR("a")+7
    READ j
    POKE i,j
END FOR i
```

Data 0,0,2,60,84,20,20,0
will define the 'pi' symbol. These characters can then be printed as codes 144 onwards. So, to print the newly-defined 'pi', type:
SPRINT CHR$ (144)

Figure 3.

```
2000 DEFine FuNction SUSR (ch$)
2010 LOCal chars,offset
2020      chars  = start + 1274
2030      offset = 8 * (CODE(ch$)+ 47)
2040      RETurn chars+offset
2050 END DEFine SUSR
```

Finally, do not forget that with this system you have the best of both worlds. In addition to the Spectrum screen layout and re-definable character font, making Spectrum conversions much easier, all the QL print, plot, scroll and window commands will still work on the Spectrum screen. So you could, say, easily mix 9 x 5 and 8 x 8 grid character fonts on the same line.

```
  LOC       OBJECT          STMT        SOURCE STATEMENT
076A'  0000 7844 4444 4400   283          DC.B    $00,$00,$78,$44,$44,$44,$44,$00  n
0772'  0000 3844 4444 3800   284          DC.B    $00,$00,$38,$44,$44,$44,$38,$00  o
077A'  0000 7844 4478 4040   285          DC.B    $00,$00,$78,$44,$44,$78,$40,$40  p
0782'  0000 3C44 443C 0406   286          DC.B    $00,$00,$3C,$44,$44,$3C,$04,$06  q
078A'  0000 1C20 2020 2000   287          DC.B    $00,$00,$1C,$20,$20,$20,$20,$00  r
0792'  0000 3840 3804 7800   288          DC.B    $00,$00,$38,$40,$38,$04,$78,$00  s
079A'  0010 3810 1010 0C00   289          DC.B    $00,$10,$38,$10,$10,$10,$0C,$00  t
07A2'  0000 4444 4444 3800   290          DC.B    $00,$00,$44,$44,$44,$44,$38,$00  u
07AA'  0000 4444 2828 1000   291          DC.B    $00,$00,$44,$44,$28,$28,$10,$00  v
07B2'  0000 4454 5454 2800   292          DC.B    $00,$00,$44,$54,$54,$54,$28,$00  w
07BA'  0000 4428 1028 4400   293          DC.B    $00,$00,$44,$28,$10,$28,$44,$00  x
07C2'  0000 4444 443C 0438   294          DC.B    $00,$00,$44,$44,$44,$3C,$04,$38  y
07CA'  0000 7C08 1020 7C00   295          DC.B    $00,$00,$7C,$08,$10,$20,$7C,$00  z
07D2'  000E 0830 0808 0E00   296          DC.B    $00,$0E,$08,$30,$08,$08,$0E,$00  {
07DA'  0008 0808 0808 0800   297          DC.B    $00,$08,$08,$08,$08,$08,$08,$00  line
07E2'  0070 100C 1010 7000   298          DC.B    $00,$70,$10,$0C,$10,$10,$70,$00  }
07EA'  0014 2800 0000 0000   299          DC.B    $00,$14,$28,$00,$00,$00,$00,$00  ~
07F2'  3C42 99A1 A199 423C   300          DC.B    $3C,$42,$99,$A1,$A1,$99,$42,$3C  copyright
07FA'  0000 0000 0000 0000   301          DC.B    $00,$00,$00,$00,$00,$00,$00,$00  Block graphics...
0802'  0F0F 0F0F 0000 0000   302          DC.B    $0F,$0F,$0F,$0F,$00,$00,$00,$00
080A'  F0F0 F0F0 0000 0000   303          DC.B    $F0,$F0,$F0,$F0,$00,$00,$00,$00
0812'  FFFF FFFF 0000 0000   304          DC.B    $FF,$FF,$FF,$FF,$00,$00,$00,$00
081A'  0000 0000 0F0F 0F0F   305          DC.B    $00,$00,$00,$00,$0F,$0F,$0F,$0F
0822'  0F0F 0F0F 0F0F 0F0F   306          DC.B    $0F,$0F,$0F,$0F,$0F,$0F,$0F,$0F
082A'  F0F0 F0F0 0F0F 0F0F   307          DC.B    $F0,$F0,$F0,$F0,$0F,$0F,$0F,$0F
0832'  FFFF FFFF 0F0F 0F0F   308          DC.B    $FF,$FF,$FF,$FF,$0F,$0F,$0F,$0F
083A'  0000 0000 F0F0 F0F0   309          DC.B    $00,$00,$00,$00,$F0,$F0,$F0,$F0
0842'  0F0F 0F0F F0F0 F0F0   310          DC.B    $0F,$0F,$0F,$0F,$F0,$F0,$F0,$F0
084A'  F0F0 F0F0 F0F0 F0F0   311          DC.B    $F0,$F0,$F0,$F0,$F0,$F0,$F0,$F0
0852'  FFFF FFFF F0F0 F0F0   312          DC.B    $FF,$FF,$FF,$FF,$F0,$F0,$F0,$F0
085A'  0000 0000 FFFF FFFF   313          DC.B    $00,$00,$00,$00,$FF,$FF,$FF,$FF
0862'  0F0F 0F0F FFFF FFFF   314          DC.B    $0F,$0F,$0F,$0F,$FF,$FF,$FF,$FF
086A'  F0F0 F0F0 FFFF FFFF   315          DC.B    $F0,$F0,$F0,$F0,$FF,$FF,$FF,$FF
0872'  FFFF FFFF FFFF FFFF   316          DC.B    $FF,$FF,$FF,$FF,$FF,$FF,$FF,$FF
087A' =00A8                  317 USERGRA  DS.B    21*8                    User-defined graphics
                             318 *
                             319          END
```


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POCKET PERIPHERAL

Psion, the company responsible for those handy programs you receive with every QL, almost two years ago produced something called an Organiser. It met with mixed response. Although presented as the first truly pocketable computer, its small physical dimensions were matched by meagre RAM capacity, a single-line display and limited programming capability. Despite that the Organiser met with some success, as anyone who has shopped in Marks and Spencer will know.

Psion has not been sitting on its hands for the last two years and has now produced Organiser II. The new machine has a two-line LCD display, vastly-increased RAM, a more powerful programming language, OPL, and increased possibilities for interfacing via the standard RS232 port.

Connections

What makes Organiser II of such interest to a QL owner? Having used it for the last few weeks, I find it virtually indispensible. In addition, the Organiser II programming language OPL, not surprisingly, bears some resemblance to Archive. if you think about that while looking at the RS232 the possibilities become exciting.

Two-way communications between the QL and Organiser II could provide a portable peripheral on which data could be recorded when convenient – say at a conference, on the train, or aircraft, and downloaded to the QL for processing later. Eidersoft is working on a lead and software to do just that.

What has Organiser II to offer? The £100 basic model CM which I have been using has 8K of RAM, 24K ROM containing the operating system and OPL language, and slots for two 64K EPROMs or datapacks.

The datapacks are treated in much the same way as disc drives but, being solid state devices are, of course, much faster. Datapacks can be supplied blank for use as storage devices or with software on board. Two packages are available from Psion, *Finance Pack* and *Maths Pack.* The higher-specification £140 model XP has twice the available RAM, 16K, a 32K ROM, capacity for 128K datapacks, and provision for an optional bar code or magnetic card reader.

All the functions of Organiser II are accessed via a top level menu which is displayed on power-up. The primary function of Organiser II is as a simple database. The resident software permits storage of individual records of up to 254 characters. Each record can be up to 16 lines long and if lines are longer than 16 characters the display scrolls from left to right so that you can read the whole thing.

The most obvious use of the facility is as an address book. Entries cannot be sorted alphabetically or processed in any other way, except perhaps via the QL, but any item may be retrieved on input of a search pattern of three or more characters.

Address book

A search for DOC will provide the relevant details filed under DOCTOR, DOCHERTY or DOVER DOCKS. The search function, called FIND on the menu, is not field-specific, so it is possible to look for, say, everyone with a Norwich telephone number by FINDing the prefix 0604.

The model CM which I have been using holds slightly more than 100 names, addresses and telephone numbers in RAM, referred to as device A. That occupies almost all the available memory space, so it will be necessary to copy it to the 16K datapack – device B or C, depending which slot it occupies.

If you are the kind of person whose address book resembles a telephone directory, 64K datapacks, or the 128K giants supplied with the XP, may be an essential extra.

In addition to more capacity, datapacks have the advantage of being more permanent than the battery-backed RAM. In the event that they become filled with garbage or outdated information they can be returned to Psion for re-formatting, or you can do it yourself, though usage would need to be heavy to justify the £45 price of the formatter.

Diary

The second most immediately useful function of Organiser II is the diary. Selection of that option from the menu displays the current day and date, together with the next available time slot. The diary pages are divided into 48 half-hour slots. The whole day can be scrolled through in seconds using the cursor keys, as can the days up to the year 1999.

To make an entry you start typing-in the appropriate time slot. An alarm can be programmed to sound at any time up to 59 minutes before the appointed time – useful if you have forgotten, embarrassing if you happen to be at the theatre. In addition to the alarm, the previously-entered text is displayed on the screen, thus avoiding the 'knot in handkerchief' problem of knowing you have something to do but not knowing what it is.

The diary has a number of other features. LIST displays all entries from the current system time, FIND allows you to pinpoint Uncle Harry's birthday, GOTO is fairly self-explanatory. Housekeeping functions like SAVE, TIDY and RESTORE allow saving to datapacks and deletion of out-of-date entries to free memory space.

Organiser II also has eight individual alarms which can be programmed to sound at regular hourly, daily or weekly intervals.

The Psion Organiser II, a powerful computer in its own right, shows potential as a useful QL peripheral. Ken McMahon examines the possibilities.

Undoubtedly there will be those who look on the features described so far as nothing more than electronic gimmickry. It would be fair to say that, on that basis, Organiser II does little which could not be achieved by a manually-organised person with a pencil and paper, albeit more slowly.

The real power of Organiser II, however, lies in the versatility it provides through its powerful, high-level programming language OPL. It opens two possibilities. Applications packages can be bought off the shelf and those with programming experience can write their own. There is, of course, nothing new in this; people have been doing it for a considerable time. It is the size and portability of Organiser II which provides the justification.

High Finance

An example of what can be achieved with Organiser II is illustrated by the Finance Pack. The suite of programs contains two applications which could be described as useful and extensive, and six which could not. The latter six include programs to calculate mortgage repayments, APR on loans, and compound interest. They are the kind of projects given to O level computer students to spend half an hour and the time taken to write them is roughly indicative of their utility. BANK and EXPENSES, on the other hand, more than compensate for the shortfall.

BANK is described adequately in the manual as 'a complete bank account transaction recorder'. It allows you to keep a record of all cheques, credits and standing orders. Particular payments can be searched, so it is possible to discover when you paid the telephone bill if BT threatens to cut you off.

In preparation for arguments with the bank manager, you can obtain a printout of your statement and records can be archived to datapack for future reference.

EXPENSES provides a record of all business expenses incurred for a period. Amounts are categorised uner a heading such as entertainment or travel and more information can be added if required. Each entry is date-stamped and, once again, an option to print is provided.

There is nothing new about that kind of application – several similar ones exist for the QL. The advantage is to have them running on something which is portable and battery-backed, i.e., permanent. Though it is likely that more software will appear for Organiser II, there may be certain applications for which programs will need to be written. Of the 200 pages in the Organiser II manual, more than half are devoted to the OPL language and it is obviously outside the scope of this review to examine it in depth.

Briefly, though, OPL can be described as a more highly-structured version of Basic which bears certain resemblances to Archive. OPL is compiled prior to running, which gives enhanced speed as well as saving valuable memory space. Source files can be saved to RAM during program development but can be scratched or saved to a datapack once the final object code has been generated.

Pocket micro

The news that Eidersoft is marketing an RS232 lead and software to permit transfer of files between Archive and Organiser II enhances its attractiveness considerably. It opens the possibility of using the organiser as a pocket micro, transferring files to the QL for more sophisticated data processing requirements.

Psion has already produced an emulator for the IBM PC; to do so for the more closely-related QL would be a task to which many are equivalent. If that were to happen, Organiser II would surely be the ultimate peripheral.

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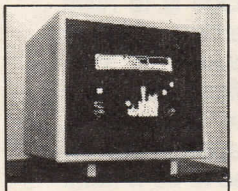
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UTILITY FILE

Ron Massey, reviews the latest applications packages to appear for the QL.

Program: CAD PAK
Price: £14.95
Supplier: Datalink Systems (Wales), Glangors, Ynyslas, Borth, Dyfed SY24 5JU.
Tel: 097081 360

An initial examination of the minimal *CAD PAK* documentation will give you an idea exactly how user-friendly the drawing package is. Dealing mainly with the use of the various icons, the miniscule instruction leaflet covers the essentials of getting the system under way completely.

With the exception of text and file information, all CAD PAK operation may be done with mouse, joystick or cursor keys. Once up and running, you are presented with the complete range of system controls in the form of icons, system access commands and sampler windows.

To the left of the drawing screen two columns of icons offer virtually every drawing tool imaginable and include cut-and-paste, single lines in any of six widths, multiple lines in any of four patterns, spray facility, as well as the more usual features such as eraser, screen wipe, and text option selection.

Directly above the drawing page, a row of commands access system controls which, when cursor-selected, produce drop-down menus providing additional options.

When CAD PAK is examined in detail, almost every illustration requirement is catered for. Text is available in four sizes; nine cursor types are available; a help window supplies operation reminders; the "STORE" option menu gives complete access to directories, file I/O, device – Microdrive or floppy – selection, or deleting an existing drawing, an important feature often omitted from illustration packages, where frequent updating of a drawing is made.

The CAD PAK auto-geometry includes rubber-banding of lines, triangles, squares, circles and polygons. An unusual omission, however, a provision for arcs has not been included.

The lower area of a screen is occupied, to the left, by a preview window indicating the effect of the drawing tool, shown in the ink colour selected. To the right of it is a column of the four solid colours available to mode 4; the remainder of the palette is obtainable from the "COLOURS" menu at the top of the screen.

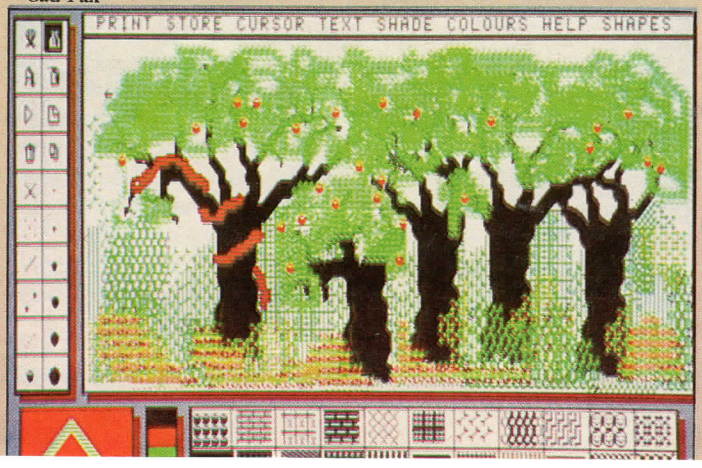
To the right of the mode 4 colour icons are 22 additional icons which provide pre-defined patterns; the size of each pattern footprint is available in three sizes.

The principal weaknesses of CAD PAK are mainly in that, if the name is to be taken literally, it lacks some of the features expected of a true CAD package intended for producing technical illustrations. It is surprising that referencing the x/y co-ordinates, a feature necessary for measuring line lengths and accurate cursor re-positioning, has not been included in the screen information. Even more important, however, is that contrary to the packaging insert illustration, it is not possible to produce full-screen representation of the drawing for either screen photography or printer dump.

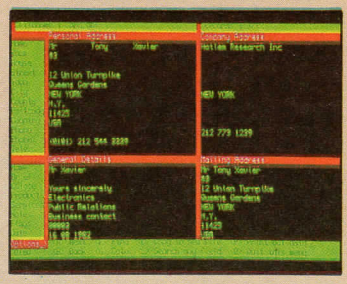
The CAD PAK screen dump does an excellent job of converting solid colour and stipples to distinctively individual monochrome patterns but, printed horizontally full-width on A4 paper, approximately 22 percent distortion of the image occurs. Also the entire screen is dumped after the black-and-white tones are reversed temporarily to accommodate the dump routine.

Whether you like the CAD PAK approach to drawing will depend largely on whether or not you like having all your drawing aids in front of you all of the time. I liked the approach, although it reduces the amount of drawing area available.

Cad Pak



If you are looking for a good general illustration package, CAD PAK has a great deal to commend it. If revised editions are released, I would like to see a better screen dump, a facility to produce a full-screen drawing for reproduction purposes, and an option for users to define their own patterns, which would displace temporarily those used for the icons in the lower set of icon windows.



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With three separate but link-compatible program applications employing the Archive run-time module, Ark is pioneering a revolutionary service for QL users with its new database management series. Designed as a professional-grade utilisation of information processing and presented in a manner which is as easy-to-use as possible, each of the programs employs a related system of record-keeping

The three systems dealt with in this review are aimed at particular applications. Versatile enough to cover a wide range of additional uses, Ark Distribution will undertake re-configuring programs for individual and more specialised purposes.

No assumption is made throughout the use of the programs regarding a user's familiarity with databases. The layout, however, is as easy to use for beginners as

Continued on page 28

Continued from page 27

for highly-qualified professional users.

Probably of more importance are the invisible features which are never readily apparent in a well-thought-out program. One of those features pertains to economical memory management. While not so important when applied to 640K memory systems, a standard QL will have most of its memory occupied by the main screen and the programme operating system.

Ark has ensured that the maximum economy is made of the remaining memory for indexing data file positions, ordering and selection of information. In use, relatively few records need to be kept in RAM at any time.

A section of the manual covers a complete description of memory requirements as related to the use of the file systems. As an added bonus, background information is detailed concisely regarding the nature of the QL memory and how it is possible to obtain the greatest amount of economy with Ark database operation.

When using any of the Ark systems with a standard QL and Microdrive storage, it is advisable to calculate the number of of files required on a cartridge for record storage. Detailed instructions are included with each program for obtaining rough calculations for individual applications and record types.

Thorough trapping is included in the program for operator and system errors. Unlike the usual laconic error massages seen usually with the QL, helpful suggestions are included along with any error messages given.

Cardfile Manager. This versatile filing system is designed for use with a pre-defined 44-field file structure which includes general details in addition to personal, company and mailing addresses. One of the distinguishing features of Cardfile is its ability to utilise optional computer-assisted projection of addresses – personal and company – and relevant salutary and complementary closes during insert and alter operations.

Other features include automatic record searches which can include text embedded within other text. Searches are also case-independent, adding greater power to the facility. When used with the expanded QL version, Cardfile also includes the use of an 18-field Mailfile and an eight field Address file.

Mailfile Manager. Occupying a smaller amount of QL memory, this application employs a pre-defined 25-field file structure covering a mailing address, notes and general details. With provision of four fields of notes totalling 933 characters, the system is for more general use than Cardfile manager.

A compact system, Mailfile includes 25 mail-file fields, 21 general-file fields and eight address fields. During normal back-up procedures, file structures are rationalised and, in effect, will usually be more compact than the original master file. That ensures, yet again, that maximum storage economy is utilised.

Librarian Manager. This system employs a pre-defined 25-field library file structure covering title , author, subject, general details, notes and a mailing address. Slightly more complex than the previous two systems, additional features include the option of selecting a range of fields for printing. A second feature runs a system check indicating how many volumes exist in the current file and the monetary value of the current file in decimal units.

Of considerable importance for users wishing to produce both computer files and printed library cards, Librarian supports a standard printing structure for card file indices. In practical terms, an experienced librarian will require approximately one hour to classify and index five books; utilising Librarian, the same period will produce finished indexing of 20 books.

Underlining the attention to detail, the manuals included with the data management systems are presented expertly. You can start immediately by following the concise instructions on a single page. As your familiarity with the system increases you will continue to find relevant points overlooked on earlier readings.

Divided into distinct sections, the Ark systems documentation covers every aspect of operation, often going into great detail regarding background information. A typical sampling of the index structure reveals such topics as:

The description of the individual files pertaining to each program in the system.

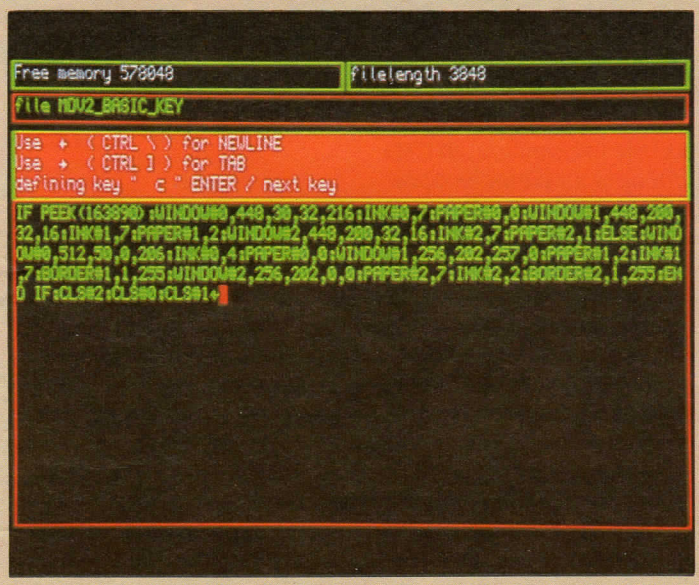
A glossary which explains intelligently the jargon pertaining to database files and operation.

A system tutorial which explains what is happening at each stage of operation, Start-up, from initial loading; through manipulating the sample files is included with the program, with which those new to database systems may acquire initial practice.

screen menus and the facilities supplied by each option, in addition to more detailed menu structure descriptions, will take you through the various options of file ordering by any of a large number of parameters.

Concise instructions for setting-up any of 15 printer drivers.

In summary, the Ark applications of the Psion Archive module are outstanding. As if the user-friendly presentation of the program was not sufficient, the exceptional manual is well-thought-out, superbly presented and well worth the reasonable price of the package.



Keydefine. An unlimited number of applications

Program: Keydefine
Price: £9.95
Supplier: Psientific Software, 37 Cottesmore Road, Hessle, North Numberside HU13 9JQ.

A QL utility with an unlimited number of applications, *Keydefine* must receive top marks and could well prove to be the most useful utility package of the year. If you have had an opportunity to use the program you will probably wonder, as I have, how you ever fared without it. A

virtual library of defined key programs may be made up for particular applications, with up to 2K – 2,000 characters – of text, Basic or control codes placed on each of 41 keys – assuming you have adequate memory capacity – and may be used from within other programs, such as any of the Psion suite or most SuperBasic programs.

Supplied with three separate versions using keys defined for use with SuperBasic or assembler programming, and another for use in Quill, the program includes a routine to make other versions by EXECing the define module.

Other features of Keydefine include the option of loading a file-handling utility which, in keeping with the services of the main program, defines keys for use with obtaining directories from any defined drive, job information, a utility printer spooler and a routine for utilising a help file or, where none is available, writing custom help files for use in your own programs.

Paragraphs for standard letters or forms may be placed on individual keys. Where a variety of specialised letter or contract types is required, several versions of Keydefine may be made and loaded from either the Quill boot or prior to loading Quill.

A multi-tasking program, Keydefine will run alongside the majority of other programs, including screen editors, and is accessed by using <ALT> along with the relevant defined key.

One of the most important aspects of a program of this nature is the clarity and presentation of the documentation and in this, like the program, Keydefine must be rated highly. The well-written instructions are laid out logically and to the point.

To obtain the maximum benefit from Keydefine, you must first decide what particular applications will be applied to the keys. That will probably also require keeping a key catalogue.

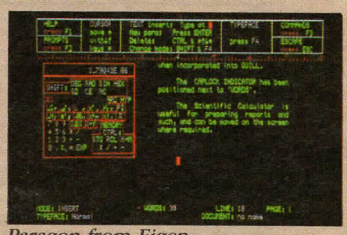
Keydefine represents excellent value for a genuinely useful and powerful utility. Of particular interest for professional programmers, Psientific Software will permit the use of its routines in commercial software free of royalties with the one proviso that they are not sold in competition.

Program: Windows, Icons and Fonts
Price: £9.95
Program: Paragon
Price: £19.95
Supplier: Eigen Software, 45 Bancroft Road, Widnes, Cheshire WA8 0LR

If the idea of making your own MacIntosh-type screen appeals to you, the first of the two offerings for this month's Source File from Eigen, *Windows, Icons and Fonts*, is a multi-purpose utility which will provide finishing touches to your programs.

Consisting of a set of routines of procedures and functions, it includes sub-routines which may be used independently and so will be dealt with as if they were separate programs.

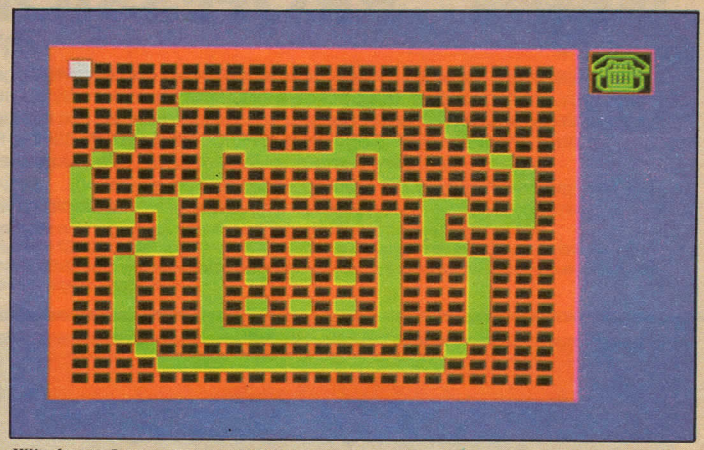
The *Icon* utility will produce up to 32 icons per file which can be linked to a SuperBasic routine to call and utilise any commands attached to them. During the design stage, each icon is



Paragon from Eigen

drawn on a 22 x 22 square matrix. As individual icon designs are completed, the new icon is stored in memory until all design work is completed. The entire set of new icons may then be stored as either a Microdrive or disc file.

In use, each icon is paged successively with the



Windows, Icons, Fonts, WIFS?

<SPACE> bar and selected individually with the <ENTER> key. It is this application, which is at variance with the more usual practice of selecting an icon from any number of others by the use of the cursor keys, which may take some understanding.

The *Windows* routine utilises seven new keywords for controlling and manipulating screen windows. Especially useful are the commands for moving the opened windows round the screen, restoring the original background; simultaneously the SWAP command is utilised for switching superimposed windows and is addressed by individual respective channel numbers.

Fonts will re-define any of the 256 characters of the QL repertoire but, for obvious reasons, use of the new character numbers should be limited to character numbers 128 to 255. Eigen recommends sensibly that the 0 to 127 character numbers should be left to their normal use.

Some possible uses of individualised character fonts, besides the more usual custom alphabet/number set, can include a type of simple animation or defining graphic symbols which can be called by letter association for use in games.

The second of the programs, *Paragon*, is intended mainly to minimise desk clutter. A number of useful facilities have been included which can be incorporated as a multi-tasking utility along with other programs such as Quill or almost any other program which does not claim every bit of available memory or is designed not to allow multi-tasking – there are still a few of those around.

Two types of screen calculator are provided – a simple floating point standard function calculator and a specially useful and powerful technical calculator which uses four interchangeable modes, Scientific, Statistical, Binary and Hexadecimal.

Other Paragon features include an eight-page notepad, a month-at-a-time calendar which may be paged forwards or backwards by months or years, a clock which includes an alarm facility for appointment reminders, a caps lock indicator – the position of which may be user-defined – and a display control which will switch off the monitor display during stand-by periods.

Overall, I felt the programs were reasonably good value. Eigen has produced a set of practical and helpful routines which, if utilised to their maximum, will eliminate a considerable amount of drudgery from keyboard entries.

I felt that the use of the icons would have been better served if they were addressable with the cursor keys. If all 32 icons were used, for example, being confined to paging-in a single direction through each one could occupy a considerable amount of time.

SINCLAIR USER CLASSIC

PROFESSIONAL ASTROLOGER

By Elmar Duensser

An amazing new Astrology System, for both beginners and experts. It comes with a large and fully comprehensive A4 manual – no knowledge of astrology at all is required. This package will allow you to not only obtain an extremely detailed personality/character delineation (typically 6-9 pages of single-spaced A4 text!!), but also to get individualised text interpretations for predicting ahead, both on a year-to-year and on a day-to-day basis. The entire system occupies 4 microcartridges with 300K of text data – diskette users get even larger files. And the system does synastry/compatability testing too, with automatic text readout! We've thought of everything this time!

"The most powerful & complete astrology package on any micro . . . . provides everything that a present day Nostradamus will need . . . . the ultimate astrology package . . . . a 5-Star (☆☆☆☆☆) program – a Sinclair User Classic (the highest award given to any program)" SINCLAIR USER

★ A £10 discount is available to owners of Super Astrologer who send in the insert card with their order. This special offer expires 31st August 1986.

★★ An Astronomer module is available to users of Professional Astrologer. £7 if ordered with Prof. Astrologer, £10 if ordered later. The module has: Moon/Venus/Mars faces, declinations, eclipses (exact display), actual Planetarium view for any time, date & location. Choice of 5 coordinate systems. Solar system display from outside/inside system, with zoom, autoincrement, variable position, etc.

SUPER ASTROLOGER DE LUXE

By Elmar Duensser

For those who do not need the full sophistication of Professional Astrologer, this package will do very nicely! 4 pages of text interpretation (personality delineation) is typical – the program is comprehensive and user-friendly. No knowledge of astrology is required.

This is what the press had to say about it:

"Succeeds very well . . . an excellent program . . . you certainly will not find as good an astrology program as this on any other home computer" **QL USER/QL WORLD**

"Incredibly fast . . . unnervingly accurate even on default files . . . a powerful tool . . . easily the best & most powerful astrology program for any micro . . . I would strongly recommend it" **QUANTA (IQLUG)**

"An invaluable tool – an excellent package – a 5 star (☆☆☆☆☆) program" **SINCLAIR USER**

Supplied on 2 cartridges, with full instructions

£24.95 ★★★★★ **WITH DOCUMENTATION**

Features	Super Astrologer de luxe	Professional Astrologer
Automatic House Calculation	★	★
Text files for House Interpretation	31K	70K+
Automatic Sign Calculation	★	★
Text files for Sign Interpretation	37K	80K+
Automatic Aspects Calculation	★	★
Text files for Aspects Interpretation	30K	70K+
Graphic print of Natal Chart	Not proportional	Proportional
Interpretation uses ASC + M.C.	–	★
Calculation Accuracy this century	Within 5 mins.	Within 1 min.
User Definable Astrological Character Set	★	★
User-Modified Interpretation files with AND/OR logic – full screen editor	★	★
User Definable Printer Driver	★	★
Output to Screen/Printer/Microdrive/Disk	★	★
Automatic Progression Calculation	★	★
Text output for Progression Interpretation allowing Year to Year horoscopes	–	★
Automatic Compatibility Calculation	★	★
Text output for Compatibility Testing allowing automatic comparisons between individuals	–	★
Automatic Transits Calculation	–	★
Text output for Transits Interpretation allowing Day to Day horoscopes	–	★
User-Definable House System	–	★ (6 defaults)
User-Definable Aspect Orbs	–	★
Text & Defaults Editor programs	SuperBASIC	M/code
"NOT" facility in Interpretations	–	★
Selective "ANYTHING" facility (eg; anything in Third House Biquintile anything in Aries) in Interpretations	–	★
Batch printing/processing	–	★
Narrowing/widening/Stationary Aspect indicator	–	★
Sample Birth data files	20	150+
Birth data file compression	–	★

SINCLAIR USER CLASSIC ★★★★★

NEW

£49.95 COMPLETE WITH LARGE A4 MANUAL

NEW

EYE-Q

THE DEFINITIVE QL GRAPHICS PACKAGE

By Charles Southey

We would love to tell you all about this superb system – but space is short. Take it from us, we've looked at every single graphics & CAD program available on the QL (**£49.95** systems included!) and combined their best features with our own ideas. The result . . . EYE-Q (yes, it is intelligent). Design your own full colour screens with complete ease – ALL the features are here. Fully driven by pop-up menus ★ single key entry ★ several zooms ★ windowing ★ proportional movement ★ paint/fill ★ rubber bands ★ arcs ★ ellipses ★ circles ★ lines ★ files ★ replicable sprites ★ horizontal & vertical stretch ★ reflect ★ invert ★ transfer ★ pan/scroll ★ undo (ie; whoops!) ★ font design editor ★ automatic anti-aliasing ★ graphic screen compression ★ offset display ★ on-screen help ★ XOR/OR cursor with variable width ★ paste ★ recolour ★ magnify ★ reduce ★ text inclusion ★ freehand movement ★ localised save/load/scroll/pan/recolour/zoom ★ integral sprite editor ★ full range of QDOS colours & stipples available through paintbox ★ user-definable defaults . . . If you already have a graphic system, throw it out. Eye-Q is in a class by itself, a state-of-the-art program from the people who brought you Sprite Generator & SUPERCHARGE. The system is supplied complete with a fully comprehensive A4 manual. Fully compatible with SUPERCHARGE, joysticks, mice &, of course, Sprite Generator.

£24.95 COMPLETE WITH EXTENSIVE DOCUMENTATION

Features	QDRAW/GRAPHIQL	EYE Q
'Freehand' cursor drawing	★	★
8-directional movement	★	★
Variable-width cursor	★	★
On-screen text inclusion	–	★
8 Character sizes	–	★
All QDOS colours available	Only solid colours	Full range of colours & stipples
Paintbox colour selection	–	★
Fully menu-driven	–	★
Zoom-in X4 & X16	★	★
Fill facilities	Only solid colour fill	Any colour fill
Rubber banded lines	★	★
Rubber banded arcs	–	★
Rubber banded circles	–	★
Rubber banded ellipses	–	★
Rubber banded boxes	–	★
Full file operations	★	★
Localised area load/save	★	★

Features	QDRAW/GRAPHIQL	EYE Q
Full screen reflection	★	★
Full screen inversion	★	★
Full screen stretches	–	★
Full screen recolour	★	★
Full screen scrolling/panning under cursor-key control with wrap-round OR edge deletion	–	★
Local area transfer	★	★
with reversal	–	★
with inversion	–	★
with stretching (hor. or vert.)	–	★
Localised scrolling/panning as above	–	★
Localised recolour	–	★
Localised/Full screen size reduction	–	★
Access to HI/LO resolution within program	–	★
Integral character editor	–	★
Screen Compression	–	★
Monochrome Save	–	★

SUPER SPRITE GENERATOR V3·5

By Roger Woodhouse

100% flicker-free – up to 256 multicoloured sprites in 256 planes with up to 16 different shape frames each. Mouse/Joystick/Keyboard compatible. Automatic collision-detection, individually variable speed, hundreds of special effects (including freeze frame, invert, reverse, ghostly sprites, sprite drawing in background, preprogrammed sprite library). Controlled by easy keywords, directly from BASIC or from machine code. No specialised knowledge required – we provide everything with this GAMES DESIGNER. Fully compatible with SUPERCHARGE.

This is what the press had to say about Super Sprite Generator:

"A well-designed & carefully planned utility – invaluable – simply excellent" ***QL USER***

"The sprites produced are very good" ***POPULAR COMPUTING WEEKLY***

"Excellent" ***THE U.S. QL REPORT***

"The results that can be achieved are excellent" ***ELECTRONICS & COMPUTING***

Most QL games on the market are written using Super Sprite Generator . . . now you can get the same effects!

£24.95 COMPLETE WITH EXTENSIVE DOCUMENTATION
or £19.95 if ordered with Eye-Q, SUPERCHARGE or Media Manager

SINCLAIR USER CLASSIC
★ ★ ★ ★ ★

SUPERCHARGE V1.18

By Simon Goodwin, assisted by Gerry Jackson

SINCLAIR USER CLASSIC

THE COMPLETE SUPERBASIC COMPILER

This amazing program automatically translates BASIC programs into optimised, ultra high-speed, relocatable, fully multitasking stand-alone machine code that loads virtually instantly!! On standard PCW benchmarks, SUPERCHARGE makes the QL up to TWENTY times faster than the AMIGA!! Independent reviews (see right) have confirmed that running speed improvements up to ONE THOUSAND times are possible . . . the ENTIRE syntax of Super BASIC (excluding program editing commands, of course!) is supported. SUPERCHARGE is compatible with the extension commands of most add-on devices & toolkits. This state-of-the-art compiler provides everything you could want in one powerful development system.

£59.95 COMPLETE with 100+ page A4 Manual.
NOTE: Users of SUPERCHARGE Version 1.16 & earlier are recommended to upgrade.

"The arrival of this product is a significant event for the QL & should help many people produce quality programs with a fraction of the effort machine code requires, and many times faster than BASIC. I found the compiler easy to use. I have no hesitation in recommending SUPERCHARGE" ***QL USER/QL WORLD***

"Superfast, Super compact and Super flexible – produces minor miracles – a superb utility – a 5 star (☆☆☆☆☆) program – a Sinclair User Classic (the highest award given to any program)" ***SINCLAIR USER***

"The best professional applications package available . . . extremely impressive . . . the quality speaks for itself" ***POPULAR COMPUTING WEEKLY***

"The claimed speed increase over SuperBASIC of THIRTY to ONE THOUSAND times was substantiated" ***ZX COMPUTING***

"A runaway success – SUPERCHARGE is dangerously close to being a completely over-the-top raver . . . performance is simply dramatic . . . the final spark that sets the QL software scene alight . . . SUPERCHARGE really shows that you can do things on a QL that you can't on other machines" ***YOUR SINCLAIR***

"SUPERCHARGE is an excellent program" ***QUANTA (IQLUG)***

NEW SUPER MEDIA MANAGER

By Colin Opie

An essential program for anyone who uses microcartridges and/or disks to store things of value! No more need you fear for the safety of your programs & data. Super Media Manager provides a host of device management tools in one integrated, fully menu-driven unit – an unbelievable 350K of programs!

- ★ Selective directory, copying, and erasing of files
- ★ Sector loading and viewing (cursor controlled)
- ★ Sector editing – Hex. and ASCII input allowed
  Automatic reports when mapping sectors
- ★ Sector copying to sector, file, device etc.
- ★ Viewing, printing, or saving of drive map details
- ★ Automatic (semi-auto on disks) recovery of deleted files
- ★ Bulk recovery of corrupt files to new files
- ★ Header block or Disk type information display
- ★ String searching by sector or file – ultrafast
- ★ Formatted print utility
- ★ Direct file copying from other disk formats (PC-DOS, MS-DOS, CP/M, Acorn DFS etc, etc) – sector copying to other disk formats.
- ★ Text file translation utility
  – expands tabs, converts CR/LF to LF intelligently: converted files may be imported to Quill.
- ★ Disk sector editing for both QL & non-QL disks, with all the usual features
- ★ Full error reporting with automatic recovery
- ★ Hexadecimal calculator
- ★ System configuration
- ★ Full directory sort facility, by name/size/type/date etc
- ★ Fully compatible with SUPERCHARGE

and much, much more . . . . . .

Features	Talent Cartridge Doctor	Super Media Manager
Automatic file recovery	★	★
Intelligent directory handling	★	★
Sector editing	★	★
File block salvage	★	★
Transliteration by character	★	★
Transliteration by string	–	★
Text file format translation	–	★
Sector viewing	–	★

Features	Talent Cartridge Doctor	Super Media Manager
Sector copying	–	★
Header block reporting	–	★
Drive map reporting	–	★
String searching (3 types)	–	★
Formatted print utility	–	★
Selective directory/copy/delete	–	★
Intelligent directory sorting (multiple criteria)	–	★
Printer echo facility	–	★
PLUS ALL THE DISK FEATURES (Cartridge Doctor has none!)		

Super Media Manager is supplied complete with an 80+ page A4 User Manual.

£39.95 COMPLETE, or £29.95 if ordered with SUPERCHARGE

SUPER ARCADIA By Derek Jones & Ian Robinson

"We flipped over Super Arcadia" ***HOME COMPUTING WEEKLY***

£9.95 FOR TWO HYPERSPEED GAMES!

SUPERFORTH+REVERSI V1.7 By Gerry Jackson

NEW

This full FORTH-83 multitasking stand-alone relocatable hyperspeed system is supplied with a version of Othello (FORTH source code provided!) to enable you to understand the language of the 1990s with ease . . . The Reversi itself is of stunning strength. Fully compatible with SUPERCHARGE, QDOS & 68000 m/c.

"A good product – an invaluable developer's tool at a good price" ***QUANTA (IQLUG)***

"Superforth succeeds very well" ***QL WORLD***

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9 levels, 3 modes, Set-up/Retract/Swop/Resign/Help/full evaluation display – beats all the other Othello programs on the market.

£9.95 COMPLETE WITH RULES

SUPER BACKGAMMON V3.0 By Ian Robinson

6 levels, 3 modes, switchable evaluation display, dual clocks, help facility, ultrafast, ultrastrong – obeys all the rules. Understands both strategy and tactics.

"Super Backgammon is brilliant" ***QL WORLD***

"I have no hesitation in recommending it" ***QUANTA (IQLUG)***

"Be warned – the computer will almost certainly beat you!" ***QL USER***

"A package that is very enjoyable to use" ***ELECTRONICS & COMPUTING***

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SUPER MONITOR + DISASSEMBLER V3.0

By Keith Poole

An extremely compact, powerful, feature-filled, SUPERCHARGE compatible machine code system – an essential for anyone who wants to write or understand m/c. "A useful, straightforward development tool" is what QL USER magazine said. Edit/Catalogue/Modify/Disassemble/Trace/Dump/Breakpoints/Output/Put/Get/Jump/Registers commands, with single key entry.

£18.95 COMPLETE or £16.95 if ordered with SUPERCHARGE or Media Manager

- ★ **SUMMER BONUS** – You may deduct £2 from the total price if you buy any 2 programs, £4 if your buy any 3 programs, £6 if you buy any 4 programs and so on. (These offers do not apply to upgrades).
- ★ Orders from abroad are welcome. Please add £1 (£2.50 for programs over £25) per program for orders from Europe and £1.50 (£4 for programs over £25) per program for orders from other countries, to cover airmail postage and packaging costs. Cheques from abroad should either be drawn on a UK bank or be Eurocheques – if you are unable to obtain either of these add £5 to your order price to cover cheque clearing charges.
- ★ If you have an early version of one of our programs, send the microcartridge(s) (not the packaging) to us accompanied by £5 (£10 if SUPER ASTROLOGER or over £25).
- ★ All our software is 100% compatible with all memory expansion & disk systems.
- ★ Programmer & dealer enquiries are welcome. Demonstrations of all our programs are available at Micro Anvika, 220A Tottenham Court Road, London.
- ★ SUPERCHARGE+ICE is available for £79.95 – or £89.95 with CHOice too! Special prices on all EIDERSOFT programs – just phone us.
- ★ All our Software is compatible with the THOR & QLT machines – we guarantee to support the QL & QL compatible market through 1986 & 1987 at the very least.

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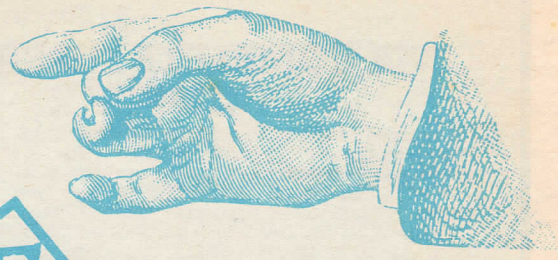
"THE ONLY SOFTWARE HOUSE DEDICATING ALL ITS RESOURCES TO THE QL"

THE ABACUS ART



This month Mike James explains the more interesting Abacus commands and continues the explanation of functions started last month.

A working spreadsheet is essentially a collection of formulae in the proper arrangement but on the way to a working spreadsheet Abacus commands are the main tools for putting the formulae into shape. There are times, however, when the use of Abacus commands can be central to the operation of a spreadsheet. In this article we look at some of the more interesting Abacus commands and continue the exploration of functions started last month.

At any time during the construction of a spreadsheet you can press the F3 key and see a full list of Abacus commands. You can then select the command of your choice by typing the first letter of the command name. In most cases Abacus will then offer you convenient defaults for the remainder of the command. If they are suitable, and they are in a surprising number of cases, pressing ENTER will set the command in action; if not, they can be altered by editing in the usual way.

Once you have used Abacus for a few hours the commands become so familiar that there is no need to have them displayed at the top of the screen and the space is better-used to display a larger portion of the spreadsheet. To remove the prompts, press F2; pressing it a second time restores them.

There are two commands intended specifically to allow you to modify an existing spreadsheet to correct or expand it. The Amend command can be used to modify a cell entry. When the command is selectable the contents of the current cell are copied to the input line and you can edit them just as if you had typed them in. That is useful for correcting any mistakes made to text and values during spreadsheet construction but extra care has to be taken when editing a formula, as the effect it has depends on how it was entered.

If you edit a formula which was entered as part of a set of formulae either using col=, row=, Echo or Copy, any changes you make are also made to all the copies – modifying one of the set modifies them all. On the other hand, modifying a formula which has been typed into a single cell changes it, and only it, even if there are similar formulae in the spreadsheet. That can cause difficulty if you want to change only one or two of a partial column or row of formulae without altering the remainder. You cannot use the Amend command because that will change all the formalae each time you change one of them. The only solution is to re-type the formula with any modifications necessary for each cell needing to be changed.

The Grid command can be used to insert or delete rows and columns and in that sense it is really the only command which edits the entire spreadsheet. After selecting Grid you are then asked to select one of Delete, Insert or Width. If you select Delete you can delete a range of rows or columns. Deleting is really a moving-up of rows or columns to replace those being removed. If you delete column B, all the columns to its right move one place to the left, i.e., C moves to B, D to C, and so on. At the edge of the spreadsheet empty rows or columns are moved in as required. Deleting column B also moves an empty column into BL. Inserting rows of columns works in roughly the same way, in that empty rows or columns are introduced into the spreadsheet but in the area you specify rather than at the edges.

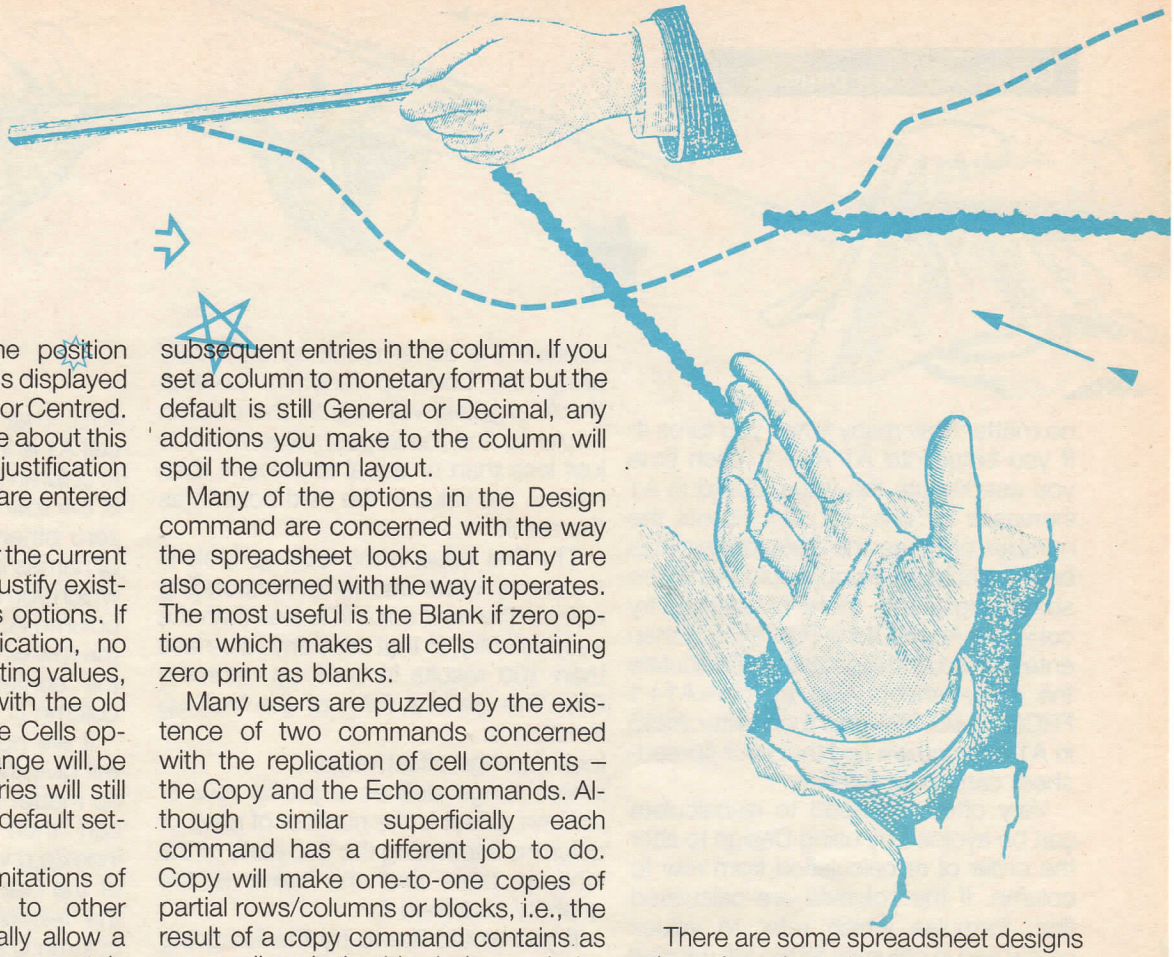
Presentation

Inserting column B introduces an empty column in place of the existing column B and moves everything one place to the right, i.e., the contents of column B moves to C, C to D, and so on.

At the edge of the spreadsheet, of course, the content of rows or columns being moved is lost. Inserting rows or columns does not make the spreadsheet any bigger. It is also important to realise that inserting or deleting rows or columns does not affect any of the existing formulae, since they are adjusted to retain their original cell references.

If column A contained the formula B1+C1 and you inserted a new column B, the formula in column A would be altered to read C1+D1.

Most of the Abacus commands are concerned with the way a spreadsheet is presented. In particular, the Justify and Units commands are concerned with the way values are displayed. The



Justify command alters the position within a cell at which a value is displayed – Left justified, Right justified or Centred. The important thing to realise about this command is that the default justification is applied to values as they are entered or computed.

You can use Justify to alter the current default justification or to re-justify existing values – Default or Cells options. If you alter the default justification, no changes will be made to existing values, i.e., they will be displayed with the old justification. If you select the Cells option, values in a specified range will be re-justified but any new entries will still be justified according to the default setting.

That is one of the few limitations of Abacus when compared to other spreadsheets, which generally allow a justification to be specified separately for entry to each cell if desired.

Centring

If you have a column of figures in an Abacus spreadsheet which you would like to centre while leaving all other numbers right-justified, you would use the Justify Cells option. That would centre all the existing entries in the column but if you entered additional values they would be displayed as right-justified, so ruining the layout of the column.

The Units command can be used to alter the way numeric values are displayed. The display format can be any of Decimal, Integer, Exponent, Percent, General or Monetary. Selecting any of those display options does not alter the value stored in a cell and that can sometimes make Abacus calculations appear incorrect. For example, if A1 contained 3.5 and B1 contained 2.5, displaying them in integer format would result in 3 and 2 respectively but if the formula A1+B1 were stored in C1 it would display 6, not 5 as you might expect – i.e., 3.5+2.5=6 rather than 3+2=5.

Another difficulty with the Units command is the Default or Cells option described for the Justify command. The way a value is displayed is determined by by the default command. The way a value is displayed is determined by the default setting of the Units at the time it is entered. Changing the Units of a particular cell or set of cells only alters their current contents – not any subsequent entries in the column. If you set a column to monetary format but the default is still General or Decimal, any additions you make to the column will spoil the column layout.

Many of the options in the Design command are concerned with the way the spreadsheet looks but many are also concerned with the way it operates. The most useful is the Blank if zero option which makes all cells containing zero print as blanks.

Many users are puzzled by the existence of two commands concerned with the replication of cell contents – the Copy and the Echo commands. Although similar superficially each command has a different job to do. Copy will make one-to-one copies of partial rows/columns or blocks, i.e., the result of a copy command contains as many cells as in the thing being copied.

You can copy the contents of a single cell to another single cell, a partial row of six cells to another partial row of six cells, and so on. Copy makes an exact copy of part of the spreadsheet at another position. Echo, on the other hand, will make one-to-many copies of a single cell – you can use Echo to take the contents of a single cell and replicate them into a partial row/column or block.

You can Echo the contents of the first cell in a column into all the other cells in the column. Notice that when you Copy or Echo formulae the result depends on whether the formulae contain relative or absolute cell references.

Copying A1 containing B1+$C1 to D1 results in E1+$C1; the relative cell reference B1 means 'the cell to the right' but the absolute cell reference $C1 means C1 no matter to where it is moved.

Important aspects

Two of the most important aspects of the way a spreadsheet operates are when re-calculation is carried-out and in what order. Normally the entire spreadsheet is re-calculated each time you make an entry but that can take time and so to speed data entry you can use the Auto-Calculate on input option of the Design command to stop re-calculation on each entry. You can force re-calculation when you have finished entering data or at any other time by using the Xecute command.

There are some spreadsheet designs where the values shown are not correct after a single re-calculation and so you might have to force re-calculation using the Xecute command more than once, perhaps even a number of times. The reason for the need to re-calculate is tied with the order in which calculations are performed.

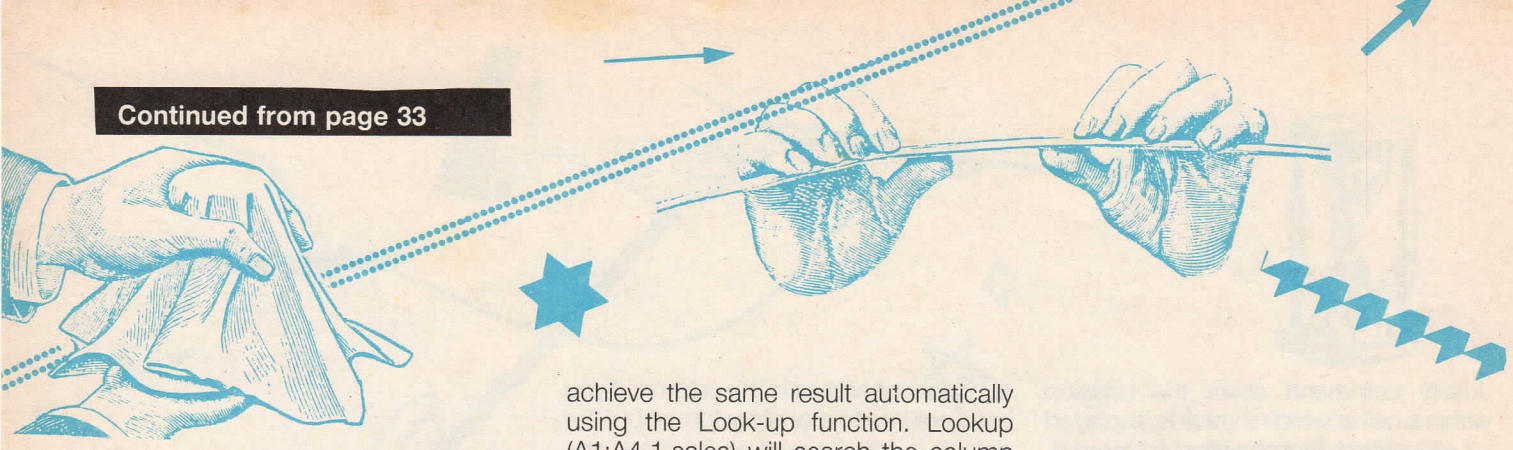
Normally all the values in a spreadsheet are calculated in row order. Row one is calculated from A1 on, then row two from A2, and so on until every cell has been calculated. That is satisfactory so long as formulae refer only to cells above and to the left of the cell in which they are stored. If a cell contains a formula which refers to a cell below, there is a chance that when it is evaluated the cell below will contain an incorrect value because it has not yet been re-calculated.

By using the Xecute command you can force an additional re-calculation which probably will mean that the formula will be calculated correctly because the cell below will, the second time around, contain a correct result. If you are in doubt about the correctness of your spreadsheet because of problems of re-calculating order, the best thing to do is to use the Xecute command until it produces no changes in the spreadsheet values.

There are situations where re-calculation always produces a different result,

Continued on page 34

Continued from page 33



no matter how many times you force it. If you enter into A1 A1+1, each time you use Xecute the value stored in A1 increases by one, i.e., A1 counts the number of times the spreadsheet has been calculated. If you would like to see something a little more interesting, try col=A1+A2 FROM 2 TO 255 and then enter 1 in A1 and repeatedly re-calculate the spreadsheet. Also try col=A1+1 FROM 2 TO 255 and then enter A255 in A1 and you will find that your spreadsheet can count forever.

Very often the need to re-calculate can be avoided by using Design to alter the order of re-calculation from row to column. If the columns are calculated first, formulae which refer to values below and in columns to the left will give the correct value the first time they are calculated. An example can be found in this month's sample spreadsheet.

The Order command will sort the rows of a spreadsheet into an order determined by the contents of a particular column. The Order command is very useful if you need to use a spreadsheet to look-up anything. If you are keeping a list of names and addresses as part of a spreadsheet you can use the Order command to sort them into alphabetical order by name and thus make it easy to find any entry.

For columns of figures you can use the Order command and the look-up function to find any entry automatically. Suppose your commission on sales varies according to total sales – less than £100 0%, £100-£500 1% £500-£1,000 3% and more than £1,000 5%, you could set up a look-up table as follows:

	A	B	C
1	0	0	
2	100	1	
3	500	3	
4	1000	5	

To find the commission rate using the table all you have to do is look down column A until you find the biggest value which is less than equal to your sales and your commission rate is in the same row in column B.

If sales =£250, the largest value less than or equal to £250 is in A2 and so your commission rate is in B2. You can achieve the same result automatically using the Look-up function. Lookup (A1:A4,1,sales) will search the column A1:A4 to find the largest value which is just less than or equal to sales; it then returns the value in the next column as the result.

The first value in the look-up table is a dummy value and its corresponding entry in the next column is less than the second entry. In that case any value less than 100 results in Look-up returning 0%. The general form of the look-up function is:

lookup(range,offset,value)

where range defines a partial row or column, offset is the number of rows or columns separating the two parts of the look-up table and the value is the quantity searched for.

If you would like to try the foregoing look-up table, enter lookup(A1:A4,1,C1) in D1 and then try entering different values for sales in C1. In general, the look-up function is very useful but it assumes that the look-up table is sorted

	A	B	C
1	Steve	Tel. No. =	01-293-099
2		Names	Number
3		Fred	01-747-384
4		Mike	01-838-111
5		Steve	01-293-099
7		John	01-938-337

into order on its first row or column and that is the connection between the Order command and the look-up function.

The only difficulty with the look-up function is that it will work only for numeric values and will not detect exact matches. That means that you cannot use it for searching lists of names for an exact match. That raises the question of whether it is possible to achieve that in some other way.

This month's example spreadsheet is telephone directory where you enter someone's name and Abacus will give you the telephone number. That is achieved effectively by searching a look-up table of names and numbers for an exact match and then returning the corresponding telephone number.

The same techniques can be used to look-up any word or number in a table. The fundamental idea is to enter into column A (from A3 to A15) the formula col=if ($A1=B3,row(),0) FROM A3 TO A15. That checks to see if the entry in cell A1 is the same as the next-door cell in column B. If it is, the number returned is the row number the formula is in and zero otherwise. Thus if you enter a list of names in column B and the name for which you are searching in A1, the rest of column A will contain zeros apart from the row where there is a match between the contents of A1 and an entry in column B.

If we now work out SUM(A3:A15) it will give the row number of the match, no matter where it is. That row number can then be used in the function index(c,r) which will return the contents of the cell at column c row r. Thus, if the telephone numbers are stored in column C alongside the names, the formula index (3,SUM(A3:A15)) entered into C1 will ensure that the telephone number of the current match is always displayed.

Tidying operation

Having invented the formula to do the job, all that is necessary is to tidy the spreadsheet . Enter Tel. No = into B1, Names into B2 and Number into C2 for headings. The entry of the name to be found can be made slightly easier by using askt("name=") in A1 so that each time the spreadsheet is executed you are prompted automatically for the name.

One difficulty you may have with entering the formulae is a !!TYPE error which causes Abacus to refuse to enter the formulae. The solution is to enter blanks or null strings to initialise all the cells in columns A, B and C to text values before you begin.

To make it work without repeated re-calculation you have to alter the order of calculation to column order so that all the formulae in column A are worked out before the formula in C1. Also to make the spreadsheet easier to use it is worth setting zero to display as blank, switching-off Auto-calculation on input and using the Order command to sort the names in column B to make manual look-up easier. This idea for searching a spreadsheet is worth experimentation.

● *Next month, in the final part of The Abacus Art, Mike James will cover Printing, Booting and Exporting.*

Viglen

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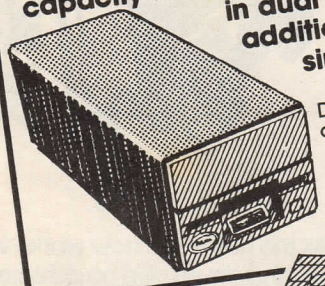
The 256k and 512k versions also include a centronics printer interface with lead and toolkit on ROM.

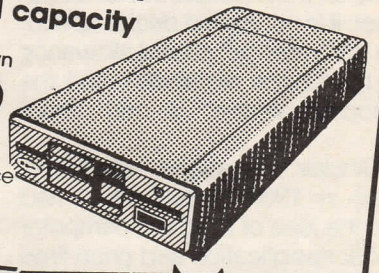
3½ inch Single Drive 720K formatted capacity with built-in power supply, in dual case for later addition of a further single drive unit



Drive in its own case **£109**

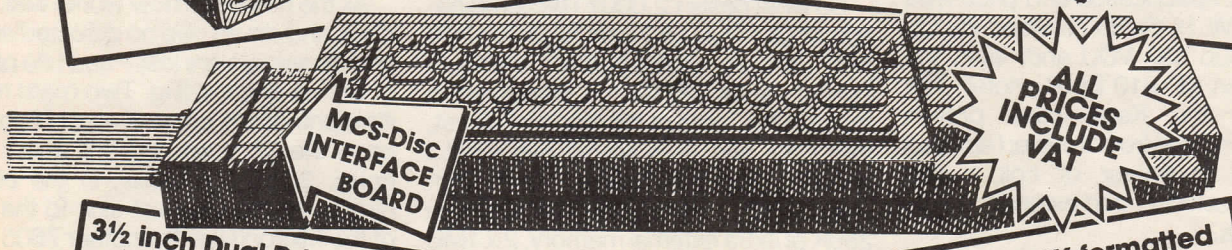
Drive with MCS-Disc Interface **£199**

5¼ inch Single Drive with built-in power supply. 720K formatted capacity



Drive on its own **£149**

Drive with MCS-Disc Interface **£234**



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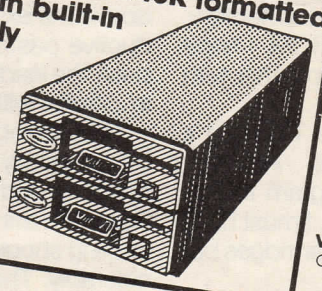

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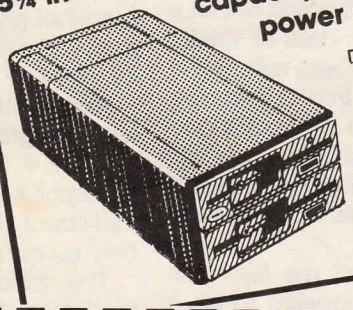

Drive on its own **£269**

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All drives are compatible and ready to plug in and use with all currently available QL Disc Interfaces. When bought with the MCS-Disc Interface, they are ready to plug in and use.

Other peripherals for the QL

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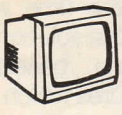

Phillips Monochrome Green Model BM7502	£85
Phillips Monochrome Amber Model BM7522	£95
Phillips Colour TV/Monitor Model 1114	£199
Phillips Standard Resolution Colour Monitor CM8501	£199
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Quen Data Daisy Wheel Printer	£168
Serial to Centronics Interface lead for above printers	£19.95
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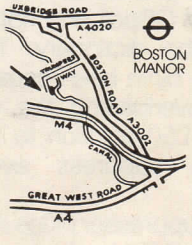

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SOFTWARE APPLICATIONS

Adam Smith looks back on his investment in the QL and asks "was it worth it?"

Is it worth £2,000? That is what my QL system has cost me, so far. The initial cost estimate of £1,000 has gradually been exceeded to the tune of 100 percent. If I were in the market now, however, the same system would cost only about £1,400. As just a home computer, that is too expensive for most people but for a business user, it is not a great deal to spend. Reclaim VAT, then get capital allowance against tax for the remainder, and the out-of-pocket amount is only about £850.

The Sinclair £4 million advertising campaign in 1984 netted me. I had given up the idea of buying a computer but the QL specification and price fired me again. W. H. Smith provided the QL and the Cub 653 VDU and, later, the Kaga Taxan KP-810 DMP printer. The Cub and the Kaga have proved excellent and free from trouble; I am glad I decided in favour of colour and medium resolution, and extended printing facilities.

It was fortunate I went to W.H.S. because I badly needed after-sales service for the next six months; the first two QLs were taken back within days or weeks of receipt, and another was rejected in the shop. All suffered from Microdrive or lock-up trouble. The shop changed everything without quibble; the girls behind the counter went so far as to select the latest hardware levels for me – I have had D09 to D14.

Number 7 has lasted me for more than 12 months and appears to be a good one. It would be a lie to state that it has not locked-up, or has not had Microdrive trouble, but the lock-ups have been through straining the software, or caused by the add-on units I bought six months ago. I must have exchanged about 30 Microdrive cartridges but the drives still work as well as one can expect.

Reading the dozens of pages of critical notes I have made it would seem that I think everything is rubbish but that is far from being the case. I feel it is a good, working system, capable of doing far more than I have been able to put on it.

System support

The level of support from peripherals and software suppliers is now high and the prices are comparable with those for other computers. That old argument for buying many computers – "will run thousands of software titles" – has never applied to the QL and is just a red herring.

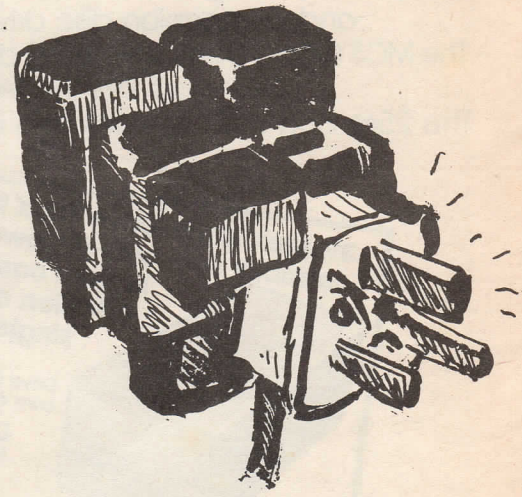
So what costs £2,000? The combination of QL, Cub 653 and Kaga KP-810 with Miracle serial-parallel interface served me for 12 months. Having gone through the route of thinking first Quest, that CST and then Medic had what I needed, I found Eidersoft. From Eidersoft I bought a PCML disc interface with 256K of extra external memory, 2 x 1MB Mitsubishi disc drives – 1/3rd-height, 3.5in. – MP internal 256K extra memory, Sureshot joystick and Ice ROM. I hope a mouse will arrive shortly, together with its modified Ice module.

Along with the hardware, I bought a few programs – QSpell, Archiver, CHOice – the tasking program for Ice – GraphiQL and KeyDefine. I must have had about 100 Microdrive cartridges but only 50 remain.

The initial impact of the add-on hardware, and QSpell, was to reduce me to the state I was in during the first days after buying the QL, spinning wheels furiously and getting very mad. Lock-ups happened by the bucketful, the speller dictionary kept filling with garbage, I lost files through crashes – not a happy period.

The solution to the crashes was to get a good copy of QSpell and not to try compressing the dictionary. The lock-ups appear to have been caused by the interface overloading the QL power supply; the £50 solution to the problem was to suppress every appliance in sight.

If you have tried suppressor plugs and adapters and are still having lock-ups, try fitting Varistors to the mains plugs on all the system units and on all household appliances which draw a high current when switching – e.g., freezers and refrigerators. Use the highest joule-capacity Varistor which will fit into the plugs; they are cheap – about £3 for five – so use them freely.



All the hardware now works well. The discs and drives give no detected errors and no sectors are lost – and I do plenty of saving and loading. Two more modifications could prevent much agony – open the QL case and drill about 100 holes, 32mm. diameter, in the cover, directly above the heat sink to the rear of the Microdrives; fit another 7805 regulator for the 5V supply to the chips above the existing one, using heat-conductive paste and a longer screw, and push the leads into the same connector, in parallel with the existing one.

That combination should give more 5V capacity, to cope with added memory, and much better cooling; apart from improving the 5V supply, the extra cooling should extend cartridge life considerably. The internal extra 256K is on a PCB which fits over the QL PCB, with no soldering being required; it works well and is not expensive.

The Ice ROM and CHOice tasking program are almost as valuable to me as the disc drives. I am a Quill user primarily but I need to have a German dictionary available all the time when making translations and the solution has been to write a routine, based on standard mailing procedures which runs under Archive. Words I do not know can be checked in a few seconds by switching from Quill to Archive.

The housekeeping functions of Ice are still available with the program-tasking and I use them frequently. A recent improvement has been to load KeyDefine before the tasks; that permits

much faster selection of Quill operations – fewer keys for regularly-used functions – and fast checking of the size of individual files. QSpell has been an embarrassment – it has found several dozen mistakes in documents which had already been sent to the customer. No document longer than about two pages leaves here before QSpell checks it now. I write service manuals and make translations, mostly concerned with domestic appliances, so I need Quill to work well. It is very slow in some respects but I like it overall and extra memory and disc drives make it much more usable.

Speedy saving

My single documents now range up to 288KB in size – more than 40,000 words – and saving takes no more than two minutes. Even saving to both drives, as I do normally is not too time-consuming. One advantage of 640K of memory is that I can usually forget about the dreaded def_tmp condition. Overflow, even on to disc, should be avoided if possible.

If a Save fails and kills your document and file when you are using a def_tmp file, it is unwise to risk trying to save to your back-up file, because there is a good chance that will be killed also. Try saving to any empty cartridge/disc first. If that fails, it is worth attempting to load the def_tmp file, or Copy/Rename it to a _doc file and see if that will load. Or try printing to a cartridge/disc.

My current Quill is version 2.35 and that can still catch you out when saving; it has caught me only once, though, and I still had one ›py left after it had destroyed two.

Business peop›› obviously do not spend all their day word processing. They need the calculating facility provided by Abacus and the database from Archive. I find simple VAT recording and overall expenditure/profitability tracking easy with Abacus, without needing extra memory; a full accounts package would require more memory. My attitude is why buy just enough memory or drive capacity when the maximum available costs relatively little more?.

The limited applications I use with Archive do not require extra memory but I have found that operations are much faster when Archive is allocated 136K – that is all it seems prepared to take. For example, when looking up words in my German dictionary, access is several seconds faster now than it was when I allocated only 20K to Archive.

Speed has been the driving factor behind my purchases. It is difficult to remember how slow operations were in the beginning. So what saves time?

Extra memory allows the Psion programs to operate faster and reduces the need for multiple files. In spite of the arguments in favour of external memory I have not identified any major difference in speed between the three blocks of memory in my QL when using the Psion programs but a combined disc interface/memory PCB is the easiest to fit.

Disc drives allow much faster saving and loading, apart from being much more reliable than Microdrives and having much greater storage capacity; 3.5in. x 1MB drives seem the best type to choose.

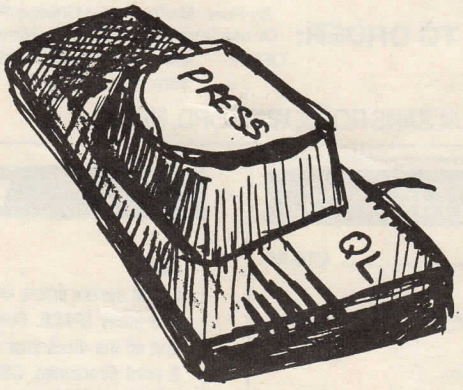
Icon front-end, e.g., Ice. If you do a good deal of deleting/copying and would like to be able to look at files and date-stamp them, this is essential.

Program-switching software, e.g., CHOice. If you need to use more than one program it will save much time.

A daisywheel printer may give better print but it will be slow and will not offer quickly the printing facilities of a good DMP.

If you are a Quill user, a good speller will do a better and faster job of proof-reading than you are likely to make.

Key definer. There are various programs available which allow you to reduce the number of key depressions



required for standard actions. That may be useful mainly for Quill users.

Print spooler permits printing to be carried-out while editing is in progress. Unfortunately, I cannot claim to have found what I need. KeyDefine includes a spooler but it does not seem to be usable for me with Quill, as it does not use my printer-driver.

Continuous stationery. For more than a year I have used scrap A4 paper for my rought prints and each sheet takes as long to load as to print. Now that I have continuous perforated paper, fanfold type, printing speed is about double. Check the size of the paper you buy; it seems most continuous stationery is U.S. size, not A4.

Using Quill. Scroll down, not up – the latter is much slower and can lead to lock-ups on basic QLs. Press F2 and get rid of the prompts, as commands work faster without them. Keep document formats on file; for example, a file with just name and address in it, together with the appropriate Design and Margin settings, and another for wide documents – anything wider than the screen reduces speed considerably. Call the appropriate file for the job being started – do not neglect to change the file name when saving. Use a key-defining program to reduce the number of key-depressions for frequent operations.

Never allow a document to overflow if you can avoid it. Break the document into smaller files, because all operations are drastically slower once overflow has occurred – unless you can overflow to RAM disc. Leave any spelling checking/proof reading and re-arrangement until the document is finished. Use the Replace and Search commands, rather than GOTO Page x if your document is large, or if you cannot remember exactly the page number you need; you may well remember a particular word/number on the required page, so just search for it.

Manual methods

Use of this command which may apply only to wide documents is finding the page required, rather than the one Quill supplies by GOTO; that may sound odd but Quill loses count of lines if you have a wide document; it counts correctly as you scroll down from the start of the document but re-numbers the lines when you scroll back up.

I number the pages manually – not by using Footer – and search for the end of the page before the one I want. When you have, say, 60 pages, Quill can be in error by perhaps five pages; always GOTO the top before saving and before scrolling down to check that the start and end of each page are where they should be.

Allocate as much memory as can be spared when multi-tasking; Quill will take 500K if offered it and only about half of that will be available for a document.

Using Archive. Save your routines as _pro files because they load faster than _prg files but remember to Run Object "filename_pro"). Eliminate all the fancy information once the routines run well and you know how to use them; that saves space and speeds operation. Give the program as much memory as can be spared when multi-tasking. Dispense with the prompts before loading your routine; with CHOice, I find F2 will not remove the prompts after a routine is loaded – apart from reducing speed, the prompts alter the display area for your routine.

To return to the opening question, I think it well worth the money I have spent. Perhaps I am biased, in that I hate typewriters; anything which could remove that mechanical monstrosity from my daily life is worth a great deal.

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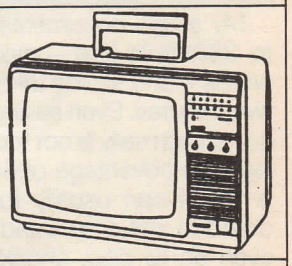

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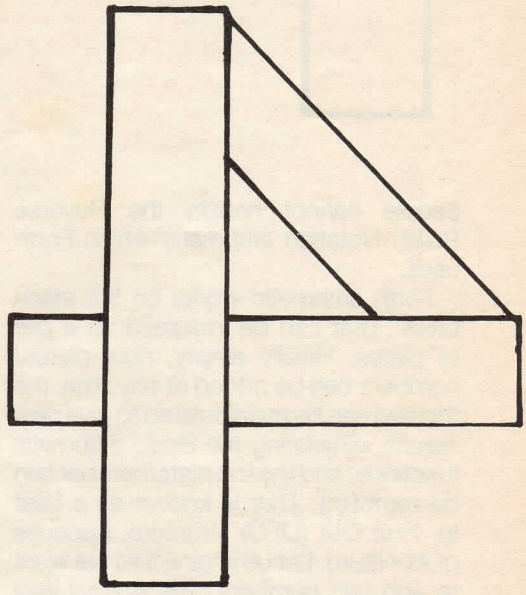
FORTH

Multilingual programming expert Charles Gerrard focuses his attention on Forth, the Structural language gaining popular appeal.



Programming seriously is an archaic art which is definitely not necessary. I do not know whether you prefer to program top-down, bottom-up or standing on your head, but there are a few accepted guidelines to good programming. The most important and most talked about is program structure. That involves programming an application in discrete functional processes, though it also involves avoiding all those GOTO a line number which can be found approximately three printer sheets away, just before another GOTO which should bring you back to somewhere in that area.

Perhaps your programming style is not so bad. If you were to imagine a perfect language for this form of structured programming, everything would be described in the form of functions, which would invoke other functions, and so on. That means that rather than trying to write and correct one large portion of code, the program can be considered as a collection of smaller problems, known as modules.

Ideally, each module should contain a small linear sequence of instructions, calling other modules where necessary, and have only one entry and exit point. That means that the module can be tested easily and, where necessary, changed, without finding suddenly that it causes problems throughout the rest of the program.

If you have been following our recent Lisp series, you will notice that the language is very much along these lines, but we can go one better. If we forget about writing programs and just write words to perform tasks, we will be one step closer to our perfect structured language.

Coincidentally, that is exactly the way the language Forth works. Written and developed in the early 1970s, at about the same time as Basic, Forth took a long time to gain acceptance but in recent years it has been becoming increasingly popular as a speedy, structured alternative.

The reason for the slowness of Basic is that it is interpreted. As the program is run, the operating system looks at each new statement and then calls the code to perform whatever actions are necessary. The faster method is to use a compiled language, where the source program is run through a compiler, creating a machine code object program which can then be run.

Forth does not truly fit into either of those catagories. It is certainly not interpreted but runs true machine code. At no time is it necessary to run a compiler manually. Forth works by defining words in terms of other words. Starting with an initial vocabulary, the user defines a new word, or function, in terms of those the computer already knows. At that point the computer immediately will create a machine code subroutine for the new word, with a particular starting address. That task is made relatively easy, when compared to full compilers, by the simplicity of the language. Obviously, if the new addition to the vocabulary uses any other previously-defined words, a simple call to the appropriate subroutine will suffice.

In summary, Forth gives you short, concise modules for a well-structured, easy-to-read sequence of tasks. It is easy to write and produces fast, compiled code. So why does everybody not use it? The only possible reason is that

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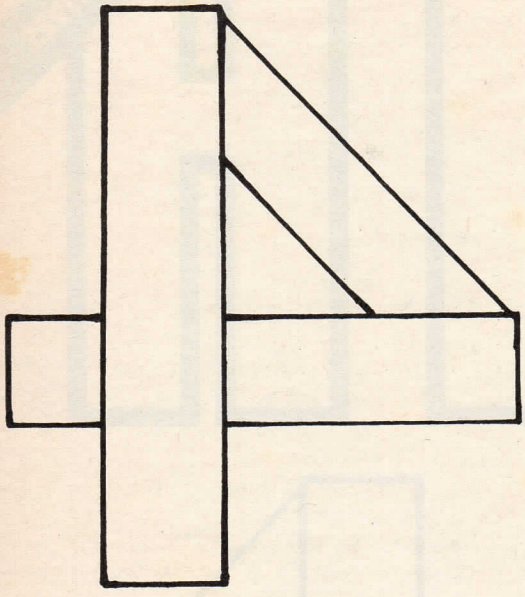


people cannot handle the Reverse Polish Notation arithmetic which Forth uses.

Forth arithmetic works on the stack basis. That can be imagined as a pile of plates. Initially empty, new plates/numbers can be added at any time; the top two can be mainipulated to give new results, simulating the Basic arithmetic functions, and the top plate/number can be removed. That is known as a Last In, First Out (LIFO) structure, because of its nature. Let us imgine that we want to add two numbers. The normal way to write this would be:

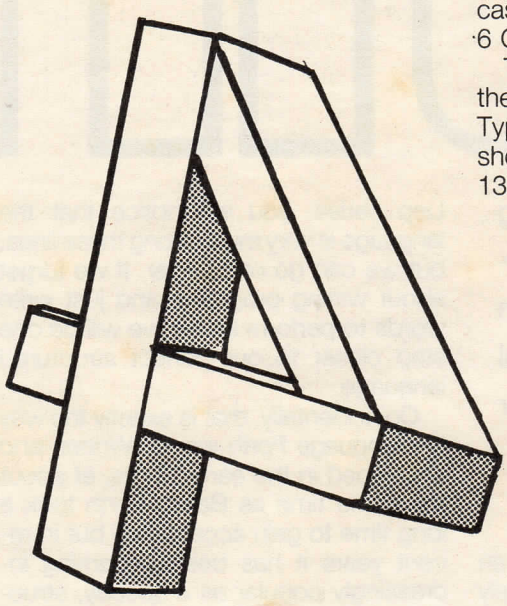
A + B

If we were using a stack system, as many computers do, the 'A' would be placed on the stack. The next character would be the '+', so the computer would have to register the fact that it intends to carry-out a PLUS operation with whatever follows the '+' character. Moving further along the line, the 'B' is found and placed on the stack. Continuing along the line, the computer finds there is nothing more. Therefore it checks its memory and finds an outstanding PLUS operation. So it removes the last two items from the top of the stack, adds them, and places the result back on to the stack.

That example was not very complex but imagine how many operations the computer may have had to remember if there had been further operations after the 'B' character. The alternative approach is to use RPN notation. In the foregoing case, this would look like:

A B +

Now the parser, checking through the line, finds a number 'A' and places it on the stack. Next, it finds another



number, 'B', and so places that on the stack. Then follows the '+' operator, so it takes the last two items off the stack, adds them, and places the result on the stack. Finding the end of the line, it terminates.

The latter method is a far more sensible and logical approach to arithmetic. Unfortunately, it does not conform to the method we were all taught and consequently can be very confusing until you become accustomed to it. After all, is it fair to ask the computer to add two numbers before telling it what the second number is? A slightly more complex operation might involve three numbers:

A B C + –

Following this, the first three numbers are placed on the stack, with 'A' at the bottom. Then the PLUS operation is performed on the top two numbers, giving the number B+C at the top of the stack, having first removed both 'B' and 'C'. Finally the SUBTRACT operation subtracts the top number (A+C) from 'A' and places the result on the stack. In conventional notation, that would be equivalent to:

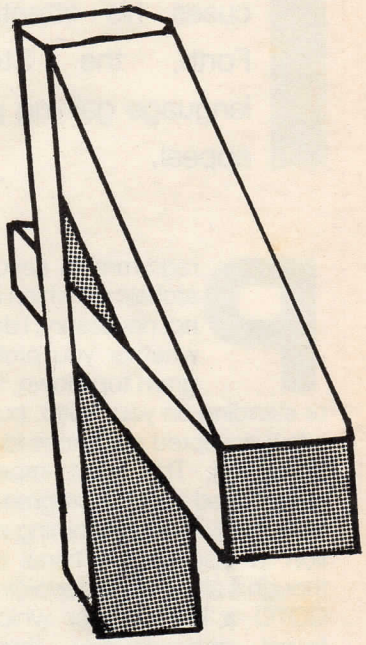
A – (B + C)

We have now dealt with the groundwork of the language and can look at how to define words. Definitions are initiated by the colon ':' character. Another very useful symbol is the dot '.', which will remove the top item from the stack and print it. If, having initialised Forth, we were to type the number '7' followed by ●ENTER®, that would be placed on the stack and the computer would respond 'OK', as it always does having completed a successful operation. We might then type the number '6', which would also be placed on the stack. We can look at the top number with the command '.S', which in this case would print-out:

6 OK

Then the command '+' should add the six and seven and leave the result. Typing '.' will remove and print this. You should get the line:

13 OK



We could easily make this into the form of a definition, which will be:

: PLUS + . ;

The semicolon ';' indicates to the computer that we have finished defining our word. This line tells the computer to add a new word, PLUS, to its vocabulary. That word should perform the '+' and '.' operations, before terminating. We can try this by typing the sequence:

7 6 PLUS

which would give the answer:

13 OK

as before. In this case, we have typed all the input on one line, though in practice it does not matter.

A slightly more complex definition might be to work out the cost of buying your favourite computer magazine for a given number of months. The definition for this would be along the lines:

: COST 125 * 100 / . ;

That multiplies the number on the stack – the number of months – by the price in pence, then places 100 on the stack and divides, to give a result in pounds, which is removed and printed using the '.' operator. If we then write the line:

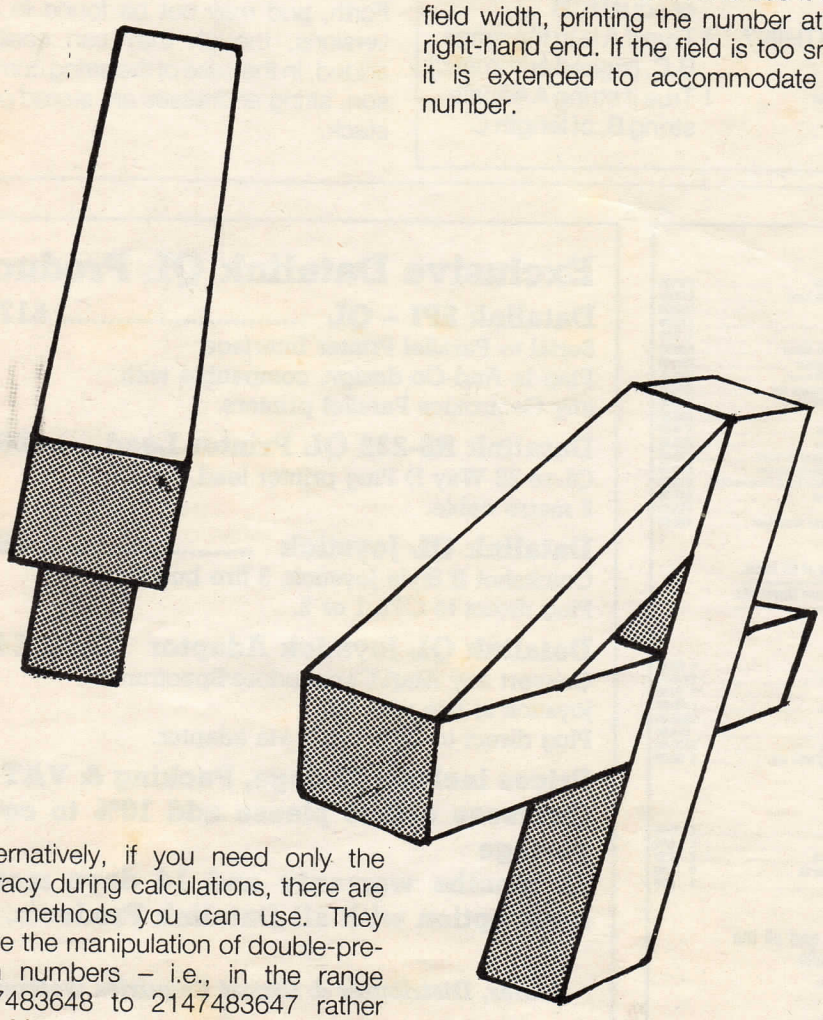
5 COST

we will get the result:

6 OK

indicating a cost of £6. That is all very well but not very useful but it highlights one of the main disadvantages with Forth – it uses integer arithmetic.

There are a number of ways around the problem. If you need to be able to print floating point results, you will have to write your own routines unless you are fortunate enough to have a Forth which includes them as standard, which is not normally the case. Of course, having written and stored the new routines, you have effectively extended your Forth language. That is one of the great advantages of the languge.



Alternatively, if you need only the accuracy during calculations, there are other methods you can use. They involve the manipulation of double-precision numbers – i.e., in the range -2147483648 to 2147483647 rather than -32768 to 32767 for single-precision numbers. Byte number ranges – 0 to 255 – are also normally available.

There are other functions which you will encounter and one of them is particularly useful for the pounds and pence problem. That is the '/MOD' operator. It works in exactly the same way as divide '/' but before placing the truncated, i.e., integer result on the stack, it places the remainder there. So if we re-write our COST function as:

: COST 125 * 100 /MOD . . ;

then type the line:

5 COST

we will get the result:

6 25 OK

Better, but not as yet perfect.

What we really need is the ability to print strings. That is done using the dot-quote (.") sequence. That, as with all other Forth operators, must be followed by a space, and anything after that, up to the next quote, will be printed directly to the screen. So our function now looks like:

: COST 125 * 100 /MOD . "£" . "." . ;

which, with the previous input, gives the result:

£6.25 OK

It is a pity about that space after the '6'. Here again, Forth can come to the rescue with its dot-R (.R) operator. When that is used, it will retrieve the top number from the stack and use it as a field width, printing the number at the right-hand end. If the field is too small, it is extended to accommodate the number.

In our situation a field width of one would be appropriate. So our final version of the function is:

: COST 125 * 100 /MOD. "£" 1 .R . . "." . ;

which gives the result:

£6.25 OK

That is rather a complex-looking line, especially if you are new to the language. Of course, you can easily redefine the symbols to be more meaningful. If you do not like the '.R symbol for the field width, why not change it? The routine:

: FIELD .R :

should do the trick.

That procedure may seem a little long-winded considering the result we have obtained but there is no reason why you should not, say, write part of the function as another word. So:

: CPRINT 100 /MOD . "£" 1 .R . . "." . ;

That can then be called by both COST and any other function as a method of printing-out monetary sums. Have you spotted the deliberate mistake? The routine works perfectly for remainders of 25, 50 and 75, which we will get in this situation, but what happens if we have a remainder of '5'. That would be printed as:

£6.5 OK

Not correct. We need to add a check to see whether any leading zeroes are necessary before printing the remainder. That of course, involves decision making, along the lines of the SuperBasic IF . . THEN . . ELSE . . ENDIF statement.

Unfortunately, the Forth test operates a little differently to that normally found in Basic. In SuperBasic, a conditional statement follows the lines:

IF (condition) THEN
(statement executed if condition is ture)
ELSE
(statement executed if condition is false)
END IF

But, to begin with, as we have seen, Forth does not operate on expressions as do other languages, but works using RPN, placing and retrieving values from the stack. It seems sensible, therefore, that rather than evaluating a condition, the IF statement looks to the stack for the answer.

As a consequence of this, the Forth IF . . THEN statement is different to the form commonly used in other languages. It is similar enough, however, to cause confusion. If you consider our RPN, then it would seem reasonable for the IF command to appear after the condition, which it does. The condition itself will also be in postfix form. A typical example such as:

IF A = B THEN statement

would appear in Forth as:

Continued on page 42

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A B = IF statement THEN

It is worth lookingmore closely at the way this workd. First, the values of A and B are placed onto the stack, with B uppermost. Next, the relational operator 's' is executed. That takes two values from the top of the stack, and places a Ture/False flag on the stack.

As with many other computer languages, this flag will be '1' for true, and '0' for false, though any non-zero value will be considered false. Once this is complete, the IF command is executed. That, as you might expect, removes a value from the top of the stack and, if it is true, executes the following statement, otherwise control continues after the THEN command. A simple test of this could be:

```
: TEST = IF. "EQUAL" THEN;
```

This will test two numbers from the top of the stack and, if they are equal, will print EQUAL before terminating. You can try this with commands like:

```
9 7 TEST
OK
```

or:

```
21 21 TEST
EQUAL OK
```

As you can see, rather than using THEN preceding the first statement to be executed if the condition is true, it is used to terminate the condition sequence. A word of warning to anybody using the Computer One Forth package. Instead of the common THEN, this implementation uses ENDIF, presumably to make it more like that of other languages. Apart from that direct substitution, the syntax of the command is the same.

We can also include an ELSE condition in the syntax, placing the ELSE after the "statements to be executed if the flag is true", and before THEN. Extending our above example:

```
: TEST = IF. "EQUAL" ELSE.
"NOT EQUAL" THEN;
```

which would either print 'EQUAL' or 'NOT EQUAL', depending on the state of the two items at the top of the stack.

You may have noticed, that due to the syntax of the language, there is no way in which the '=' operator could be anything other than a relational operator, since it is never used in asigning values, as in SuperBasic. There are a number of relational operators, other than the '='. Table One gives a selection of these. In all cases, where multiple letters are shown in the operation, the latter is assumed to be higher in the stack, i.e., nearer the top, and the first to be accessed. So, in the operation:

True if A equals B

then 'B' is assumed to be at the top of the stack, though with that operation it would not matter. All of the operations will remove the appropriate number of values from the stack, and place a true/false flag onto the stack. The last two relations shown are from Computer One Forth, and may not be found in other versions, though they can easily be added. In the case of the string comparison, string addresses are stored on the stack.

TABLE ONE

RELATION	OPERATION
=	True if A equals B
>	True if A is greater than B
<	True if A is less than B
0<	True if A is less than zero
0=	True if A equals zero
0>	True if A is greater than zero
<>	True if A does not equal B
0<>	True if A is non-zero
<=	True if A is less than or equal to B
>=	True if A is greater than or equal to B
WITHIN?	True if A is in the range B.C. (signed arithmetic)
S=	True if string A equals string B, of length C

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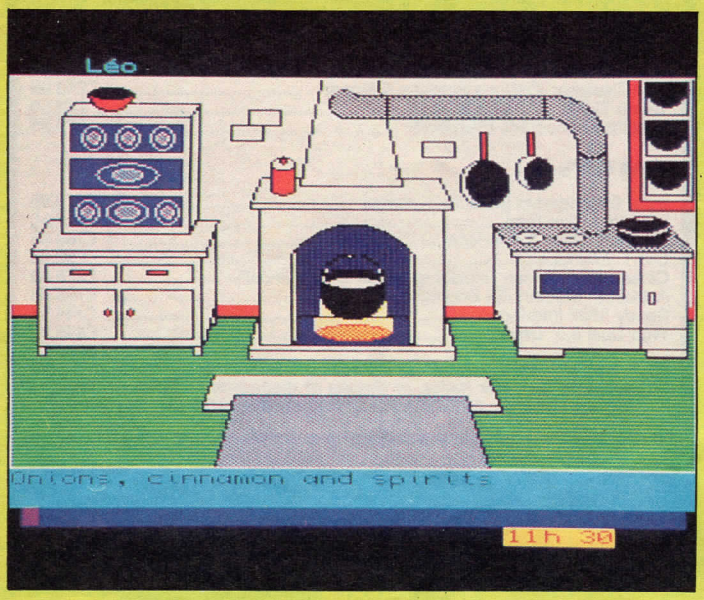
SOFTWARE FILE

Ken McMahon and John Barnes fight over the only *Sinclair QL World* joystick to bring you this month's game reviews.

Mortville Manor

c/o Rio Promotions Ltd, Dept. QL, 28 Waverley Grove, London N3 NPX
Price: £19.95



Mortville Manor. A good balance of text and graphics.

As the instruction booklet states, Mortville is more of an adventure than a journey.

As Jerome Lange, a private eye, you receive an urgent telegram from Julia Defranck, a critically ill old friend who is appealing for help. On receipt of the telegram you leave Paris hurriedly for the isolated country house but your arrival at Mortville sadly is too late. Did Julia die from natural causes? Or has some heinous crime been committed? As a detective your appetite for intrigue is wetted and you stay to investigate the mystery.

In residence at Mortville are the relatives of the deceased and Max the servant, who welcomes you on arrival. Naturally, none of those people is particularly keen to talk after the bereavement but if headway is to be made it is essential that you make them do so. Like most adventure games the vocabulary is limited but sufficient to make conversations believable. There are many words not known to you at the beginning of the game, however, which produce a more fruitful response from the residents of the Manor. It is therefore important to establish the proper questioning technique early in the game, as that will supply you with a greater number of clues. For some time I could get a response from the characters only by typing Julia but once I had discovered how to phrase questions I learned a great deal more.

Mortville Manor is large so there are many rooms to explore. Before you enter each room a cryptic clue is displayed on the screen which is intended to point your search in the proper direction. Only some of those clues helped me but they all provide the necessary incentive to discover what is waiting to be found.

Exploration of the rooms is made more enjoyable by the very good graphics and the tremendous attention to detail, for example the light which casts shadow in the bureau. The graphics greatly enhance the atmosphere of the Manor and provide every budding detective with ample opportunity to glean useful clues.

The cursor keys can be employed to help, which makes examination of the rooms and their ante-chambers a little more thorough. With the correct commands, furniture can be opened and objects looked at in detail, so you can feel satisfied that each room has been searched properly.

Obviously to play an adventure game properly you need to spend a great deal of time on it, which I could not do. After about four hours of playing sleuth, I had learned very little to help my investigations and encountered only a small percentage of the 80 or so screens.

That was no fault of the game. The degree of difficulty is sufficiently high which means it is not the kind of adventure you can play in a few hours. One criticism is the time taken to paint the screens which after a prolonged period of playing, becomes irritating, but the quality of graphics more than compensates. I enjoyed playing Mortville Manor as it has the correct balance of text and graphics but perhaps a little less of a challenge in the early stages would have been an improvement.

The word is that Pyramide have several more QL games in the pipeline. They are currently available in France, but have yet to be translated.

BJ in 3D Land

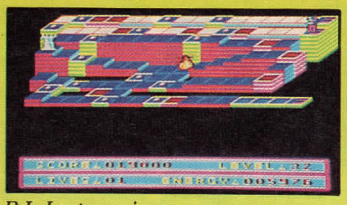
Publisher: Eidersoft
The Office, Hall Farm, Ockenden, Upminster, Essex
Price: £12.95

BJ is a kind of superstar of the Eidersoft games range. Well, perhaps not exactly a superstar, but having appeared in two other titles he doing considerably better than most game characters.

The BJ scripts inevitably involve him getting lost somewhere or other; this time it is in 3D land, a "tortuous three-dimensional maze", but what the cassette inlay does not mention is that it is a very pretty tortuous maze. Looking rather like one of those stages made up of different-sized cubes, 3D Land cubes are like licorice allsorts – the pink, yellow and black striped ones people leave when you offer them around. I always wondered what happened to them.

There are three types of allsort. Some have diamonds on top – they are the ones to go for as every diamond collected earns valuable points. Multi-coloured allsorts are energy-giving squares, again well worth a visit, because when BJ's energy runs out that is the end of the game. Red-and-black chequered squares should be avoided at all costs. Land on one of them and BJ's energy will be drained away before you can say Bertie Bassett.

The object of the game, you may by now have gathered, is to wander round the maze collecting as many diamonds as you can before the energy runs out.



B.J. Lost again

Of course, things are never so simple. There are monsters, if that is the word for them, which roam about in a fairly random fashion, bumping carelessly into BJ and draining his precious energy still further.

The monsters are fairly cute – glow-worms, snakes with apples on their backs, and something which looks like an animated fireball, but I could be wrong. Cuteness aside, they were a little disappointing. Half the time they did not take a great deal of interest in BJ. Perhaps they were looking for friends; they were a little thin on the ground and some company certainly would have enlivened things.

Apart from that criticism, BJ in 3D Land is an otherwise excellent game. One word of advice. Unless you are using the cursor keys, make sure you have a good joystick. A high degree of accuracy is required to jump between squares and there is nothing more infuriating than ending somewhere you did not wish because your joystick will not do what you tell it to do.

Crazy Painter

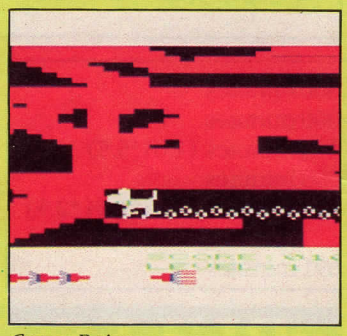
Publisher: Microdeal Box 68, St Austell, Cornwall
Price: £12.95

The object of this game is quite simple, to paint the screen as quickly as possible with as little paint as you can. Naturally enough, a menagerie of assorted creatures make your task more difficult.

There are the usual home decorators, pests, like the dog which walks across the wet paint leaving footprints, and the more obscure, such as the snake which eats its way across the screen. With all those obstacles it is difficult to be economic with your paint, especially when some take the paintbrush if you endeavour to paint over them.

The game starts obviously enough at level one and each stage gets faster, making your job more difficult. On completing your levels successfully you are entered on a challenge stage where the object is to stop paint dripping down the screen with a scraper, a welcome change from the painting. You return quickly to the paintpot, however, and continue getting faster, using increasingly large quantities of paint, and getting more irritated.

The graphics are not



Crazy Painter

spectacular, but suit the game well, but some of the colour combinations can be a little fierce on the eye. There is also an extremely irritating selection of tunes to whistle while you work, but *London Bridge is falling down* played a few times is a good enough reason to turn off the sound.

The major problem, is the lack of variety. The early screens are reasonably enjoyable but the repetition becomes tedious after four or five levels, with the increase in speed not being a sufficient substitute for more original ideas. After several games I was managing to get a respectable score which indicates the simplicity of the game. Crazy Painter is not a bad game, but its lack of originality or complexity does not entertain the player for any length of time.

Executive Adventure

Publisher: Gemini Marketing, Gemini House, Concorde Road, Exmouth, Devon EX8 4RS
Price: £12.95

There is no shortage of adventures for the QL at the moment. Whether your preference is for the more traditional sword and sorcery fantasy, or something a little more down to earth, there is a diversity of scenarios from which to choose.

Executive adventure falls into the latter bracket – the ultimate escape for those confined to the mediocrity of low-ranking corporate life but with unfulfilled ambitions to reach the boardroom. Subtitled Rags to Riches, the game casts you in the role of a lowly tramp. Your objective is to drag yourself from the depths of skild row and, using nothing more than your wits, to reach the top of the table in the company boardroom.

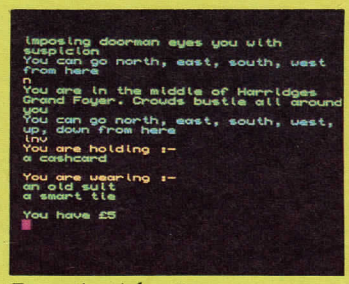
The adventure begins on a cold, dismal morning with you on the inevitable park bench. You have nothing – not even a bottle of cheap sherry to cheer you. A brief wander round the park will have to suffice but there is little of interest and you soon go round in circles.

There is nothing for it but to venture into the high street and see what is happening. Without giving away too much here is the *Sinclair QL World* guide to a swift climb up the ladder of success, or at least the first rung or two.

Travelling westward from the park you will soon find yourself outside Claridges, the posh peoples' department store. Waste no effort trying to get in at that stage; the doorman does not take kindly to tramps and even a tramp's ego can suffer from being thrown in the gutter.

Instead, go to Rotten Row, where you will find more suitable attire. It takes more than a smart suit to impress the doorman at Claridges, however, so be prepared to splash out on some accessories.

If you are feeling hungry, a trip to a burger bar might satisfy your appetite. I decide to miss that. Resources are scarce in the early stages and nobody ever made it rich by stuffing their faces with quarter-pounders.



Executive Adventure

The Bark West bank seemed like a good place to pick up some readies with the cashcard I discovered in the suit pocket. I had difficulty, though, in persuading the machine to accept it. Should anyone else discover the secret, please let me know.

When you are well-loaded with cash and suitably dressed, it is time to go shopping. From there, you are on your own. Claridges is like any other department store – plenty to buy but not much of it is affordable. The key is to buy only things which look as if they might make you more money or lead to a useful contact. Be careful not to fall down the hole by the cigarette kiosk.

As text-only adventures go, Rags to Riches scores fairly well; the theme is excellent. In the early stages at least the clues are not particularly complex and a fair amount can be achieved in a short time. That makes it in an ideal game for novices. There are two criticisms. The parser, the part which works out syntax, is not incredibly sophisticated and the game is therefore a little fussy about accepting certain constructions. Second, a text adventure relies solely on description for atmosphere and I felt the game could have benefitted from a little more imagination in that respect. Otherwise a perfectly enjoyable piece of escapism.

PUZZLE PAGE

It was a pleasant, sunny day. Significant in that all the other days I could remember were not pleasant sunny days. I particularly remember it, having spent most of the day staring out of window, musing over puzzle page possibilities. Of course, I had been doing it for days – usually finishing over the bottom of a pint at the local. Unfortunately – or not, depending on your point of view – there were a number of locals. They were called:

The Anchor	(A)
The Black Swan	(B)
The Coach & Horses	(C)
The Duke of York	(D)
The Eight Bells	(E)
The Fox & Hounds	(F)
The George	(G)
The Horseshoe	(H)

Regular readers will undoubtedly have guessed where all this is leading. What I want to know is how long it would take me to visit all eight public houses, have a single pint – taking exactly 10 minutes in each, and return home. Figure one gives the distances, in minutes of walking time, between any two locations, and figure two gives the distances from my home to any of the eight pubs.

The problem is that after a little liquid refreshment, complex manoeuvres, such as walking, tend to be more difficult than normal. After much empirical analysis, I was able eventually to assign a "potency" factor to the various draughts – figure three. Multiply subsequent walking time by that factor to obtain the real result.

Naturally, the factors are cumulative. So if I were to travel from home to the Anchor, then to the Black Swan, then home, the time would be:

Home to Anchor	=	4.500 minutes
Drinking time	=	10.000 minutes
Anchor to Black Swan	=	5.555 minutes (1.01*5.5)
Drinking time	=	10.000 minutes
Black Swan to Home	=	3.636 minutes (1.01*1.44*2.5)
TOTAL TIME TAKEN	=	33.691 minutes

You need not worry about such minor matters as opening hours and so on. If we assume, however, that I leave home at exactly 6 p.m., what time to the nearest minute can I expect to arrive home?

As usual, I would welcome any elegant solutions to the problem and, if they are short enough, I will include one of them in the solution page. They should preferably be in SuperBasic, since it is the only language common to all QL owners.

Figure 1.

	B	C	D	E	F	G	H
A	5.5	6.5	3.0	7.0	8.0	6.0	4.0
	B	4.5	4.5	6.5	3.5	7.0	3.0
		C	3.5	2.0	3.5	3.5	6.5
			D	4.5	6.0	3.5	4.5
				E	5.5	2.5	8.0
					F	7.0	6.0
						G	7.5

Figure 2.

Distances to HOME (in minutes):

From:	Anchor	= 4.5	Eight Bells	= 4.5
	Black Swan	= 2.5	Fox & Hounds	= 4.0
	Coach & Horses	= 2.5	George	= 5.0
	Duke of York	= 2.0	Horseshoe	= 4.0

Figure 3.

Public House	!	Potency			
Anchor	!	1.01	Eight Bells	!	1.53
Black Swan	!	1.44	Fox & Hounds	!	1.67
Coach & Horses	!	1.12	George	!	1.34
Duke of York	!	1.82	Horseshoe	!	2.01

RULES

All entries must be written on the panel provided on this page. Any other form of entry will be disqualified.
Entries must be sent by post to:
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London SW1H 9ED
to arrive no later then Friday, August 14, 1986

The winner will be the first correct entry drawn out of the editor's tankard. In the even that nobody submits the correct arrival time, the winner will be the person with the closest answer.

All entries will be judged by the Editor of *Sinclair QL World*, whose decision is final. No correspondence will be entered into regarding the result.

ENTRY FORM

Arrival time = _____

Route = Home _____ Home

Name: _____

Address: _____

_____

SOLUTIONS

I now know why there were so few entries to the Network Problem. You were all too busy counting ball bearings and building pyramids.

For anybody who missed the puzzle, you were trying to find a palindromic number i.e., one which reads the same forwards as backwards, which contains the same digits, such as 2222.

Having found this number, which represents a large pile of ball bearings, you had to split it into two groups, one of which would form a triangular pyramid, the other a square pyramid, with nothing remaining.

The additional puzzle was to find a solution where, if you were to add the number of levels in the two pyramids thus formed, you would get another palindromic number.

Having found this, and given that the diameter of each ball bearing was one centimetre, I wanted to know the combined heights of the two pyramids, to the nearest centimetre.

The response to this problem was enormous and I would like to thank everybody for their very comprehensive solutions, a number of which were written in languages other than SuperBasic, including Pascal, Fortran and APL. Figure four shows a program by Andre Klap, which will give the required result. The functions 'triangle' and 'square' give the total number of balls in a pyramid as a function of the level/parameter – 'ls' and 'lt', respectively.

You will notice that they store the results in arrays, 'tr' and 'sq', minimising the calculations involved at later levels. All combinations of square and triangular pyramids are tried for totals of 222. 333, 444, and so on, balls.

Whenever two pyramids are found which add up to this total, the function 'check' is called to see whether the combined levels are also palindromic. If this is the case, then 'ok' is set to true, and the solution is printed.

Having found the correct solution – figure five – the problem remains of finding the height of each pyramid. This is easily done by considering each pyramid. This is done easily by considering each pyramid to be 'level-1' centimetres high, by taking lines from the centre of the top ball bearing to the centres of the base corner ball bearings. If we call these new levels ITRI and LSQR, simple trigonometry will give the vertical heights as:

LTRI * sqrt (6)/3 for the triangular pyramid, and

LSQR * sqrt (2)/2 for the square pyramid. Do not forget to add one to the result of each of these for the radius of the top and base ball bearings which we subtracted initially. Based on our figures, this gives a final result of:

(288 * sqrt(6)/3) + (275 * sqrt(2)/ 2) + 2 which gives:

431.6054 cms.

or

432 cms. to the nearest centimetre.

The editor is still determined to prove this answer but we were able to interrupt his search for centimetre diameter ball bearings to choose Barry Dyke of Huddersfield as the winner. He will receive a year's subscription to *Sinclair QL World*.

Figure 4.

```
100 REMark ** Solution to Pyramids Puzzle (June 1986)
110 REMark ** by Andre Klap
120 REMark ****************************************
130 :
140 DEFine FuNction square(ls)
150     IF sq(ls)=0 THEN
160         sq(ls)=ls*(1+ls*(3+2*ls))/6
170     END IF
180     RETurn sq(ls)
190 END DEFine square
200 :
210 DEFine FuNction triangle(lt)
220     IF tr(lt)=0 THEN
230         tr(lt)=lt*(2+lt*(3+lt))/6
240     END IF
250     RETurn tr(lt)
260 END DEFine triangle
270 :
280 DEFine PROCedure pyramid(x,a,b,c,d)
290 LOCal rest
300     a=1
310     REPeat outloop
320         b=square(a)
330         rest=x-b
340         IF rest<0 THEN EXIT outloop
350         c=1
360         REPeat inloop
370             d=triangle(c)
380             IF d=rest THEN
390                 check a+c
400                 IF ok THEN
410                     rept x,a,b,c,d
420                     EXIT outloop
430                 END IF
440             END IF
450             IF d>rest THEN EXIT inloop
460             c=c+1
470         END REPeat inloop
480         a=a+1
490     END REPeat outloop
500 END DEFine pyramid
510 :
520 DEFine PROCedure rept(x,a,b,c,d)
530     PRINT : PRINT"   SOLUTION ..."
540     PRINT"Square   [lev/balls] ",a,b
550     PRINT"Triangle [lev/balls] ",c,d
560     PRINT"TOTAL    [lev/balls] ",a+c,b+d
570     PRINT"--------------------------------"\\ : BEEP
580 END DEFine rept
590 :
600 DEFine PROCedure check(y)
610 LOCal a$,l,i
620     a$=y : l=LEN(a$)+1 : ok=1
630     FOR i=1 TO l DIV 2
640         IF a$(i)<>a$(l-i) THEN
650             ok=0 : EXIT i
660         END IF
670     END FOR i
680 END DEFine check
690 :
700 REMark ** MAIN PROGRAM **
710 :
720 DIM sq(2000),tr(2000)
730 CLS
740 :
750 num_dig=3 : digit=2
760 ok=0 : lv=0 : ld=0 : bv=0 : b=0
770 :
780 REPeat loop
790     numb$=FILL$(digit,num_dig)
800     n=numb$ : PRINT numb$
810     pyramid n,lv,ld,bv,bd
820     IF ok THEN EXIT loop
830     IF digit=9 THEN
840         digit=1
850         num_dig=num_dig+1
860     ELSE
870         digit=digit+1
880     END IF
890 END REPeat loop
900 CLOSE#3
```

Figure 5.

SOLUTION			
Square	(lev/balls)	276	7046326
Triangle	(lev/balls)	289	4064785
TOTAL	(lev/balls)	565	1111111

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THE P+R:O=G<S

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QL-Bert
Esben Krag Hansan

This is a version of the popular arcade game. The object is to jump around a pyramid of blocks leaving coloured spots as you go, avoiding the dangerous bell which rolls down from the top of the pyramid.
QL-Bert contains nine pyramids, each more difficult than the last. An extra life is awarded at 10,000 points and there is a special bonus if all nine pyramids are completed. To control Bert use keys D,C,H, and B.

The program is written in SuperBasic, with a small machine code routine. Simply enter the listing, save it and start with run.

```
100 REMark           QLBERT
110 REMark
120 REMark (C) 1985 Esben Krag Hansen
130 REMark
200 MODE 8
210 WINDOW 512,256,0,0: PAPER 0: CLS
220 WINDOW 448,200,32,16: PAPER 0: INK 7: CLS
230 high=5000: init_udg
1000 REPeat game_loop
1010 score=0: lscore=0: lives=3: level=0: RESTORE
10000
1020 sound 80,10: sound 40,10: sound 30,10: sound
20,10
1200 REPeat level_loop
1210 level=level+1
1220 IF EOF THEN
1230 sound 60,50: sound 55,40: sound 45,20: sound
50,20
1240 RESTORE 10000
1250 OVER 1
1260 FOR i=1 TO 20
1270 FOR n=0 TO 7
1280 INK n: AT 10,13: CSIZE 3,1: PRINT "BONUS:";le
vel*100: CSIZE 2,0
1290 END FOR n
1300 END FOR i
1310 INK 7: OVER 0
1320 score=score+level*100: test_score
1330 sound 50,30: sound 45,15
1340 END IF
1350 init_level: sound 60,30: sound 40,10
1500 REPeat play_loop
1510 move_man
1520 IF mconts=-2 OR mconts=0 THEN
1530 scr(mlin,mkol)=mconts
1540 scr(klin,kkol)=kconts
1550 man_dead: IF lives=0 THEN EXIT level_loop: EL
SE NEXT play_loop
1560 END IF
1570 AT 1,16-LEN(score): PRINT score
1580 IF mpcount=maxp THEN score=score+bonus: test_
score: EXIT play_loop
1590 IF bonus THEN bonus=bonus-10: AT 19,20: PRINT
 bonus;" "
1600 move_ball
1610 IF kconts=-1 THEN scr(mlin,mkol)=mconts: man_
dead: IF lives=0 THEN EXIT level_loop
1620 END REPeat play_loop
1630 sound 50,15
1640 END REPeat level_loop
1650 sound 10,50: sound 40,100: sound 90,110
1660 IF score>high THEN high=score: print_scores
1670 CSIZE 3,1: OVER 1
1680 REPeat floop
1690 FOR n=0 TO 7
1700 AT 5,10: INK n: PRINT "GAME OVER"
1710 IF INKEY$(0)<>"" THEN EXIT floop
1720 END FOR n
1730 END REPeat floop
1740 CSIZE 2,0: OVER 0
1750 END REPeat game_loop
2000 DEFine PROCedure move_man
2010 key=(KEYROW(4)&&68)+256*(KEYROW(2)&&24)
2020 IF key<>64 AND key<>2048 AND key<>4 AND key<>
4096 THEN
2030 FOR i=1 TO 200
2040 END FOR i
2050 RETurn
2060 END IF
2070 figur mlin,mkol,2,139: scr(mlin,mkol)=mconts
2080 mlin=mlin-1+2*(key=2048 OR key=4096)
2090 mkol=mkol+(key=4 OR key=4096)-mlin MOD 2
2100 BEEP 200,200
2110 mconts=scr(mlin,mkol): scr(mlin,mkol)=-1
2120 IF mconts>1 THEN score=score+12-mlin: test_sc
ore: mconts=mconts-1: mpcount=mpcount+1: figur2 ml
in,mkol,cols(mconts)
2130 figur mlin,mkol,2,139
2140 END DEFine
2500 DEFine PROCedure move_ball
2510 figur klin,kkol,3,137: scr(klin,kkol)=kconts
2520 klin=klin+1: rv=RND(1)
2530 kkol=kkol+rv-klin MOD 2
2540 kconts=scr(klin,kkol)
2550 IF kconts=0 THEN kkol=kkol+1-2*(rv=1)
2560 kconts=scr(klin,kkol)
2570 IF kconts=0 THEN rv=RND(1 TO maxpos): klin=ku
gpos(rv,1): kkol=kugpos(rv,2): kconts=scr(klin,kko
l)
2580 scr(klin,kkol)=-2: figur klin,kkol,3,137
2590 BEEP 30,0,0,-1,0
2600 END DEFine
3000 DEFine PROCedure man_dead
3010 FOR i=1 TO 255 STEP 3: BEEP 20,i
3020 lives=lives-1: print_level_etc
3030 figur mlin,mkol,2,139
3040 figur klin,kkol,3,137
3050 init_positioner
3060 END DEFine
3500 DEFine PROCedure test_score
3510 IF score-lscore<10000 THEN RETurn
3520 lscore=score: lives=lives+1
3530 sound 50,10: sound 30,10: sound 50,10: print_
level_etc
3540 END DEFine
4500 DEFine PROCedure felt(x,y)
4510 INK fcol3: curs 0,0,128: curs 11,0,129: curs
21,0,130
4520 INK fcol1: curs 0,4,131: curs 0,13,134: INK f
col1,fcol2: curs 11,4,132: curs 11,13,135
4530 INK fcol2: curs 21,4,133: curs 21,13,136
4540 END DEFine
4800 DEFine PROCedure curs(xo,yo,c)
4810 CURSOR x+xo,y+yo: PRINT CHR$(c)
4820 END DEFine
5000 DEFine PROCedure figur(l,k,i,c)
```

Continued on page 50

```
5010 x=-18+k*30+1 MOD 2*16: y=8+1*14
5020 INK i: OVER -1
5030 curs 0,0,c: curs 11,0,c+1
5040 INK 7: OVER 0
5050 END DEFine
5200 DEFine PROCedure figur2(l,k,i)
5210 x=-17+k*30+1 MOD 2*16: y=12+l*14
5220 INK i: OVER 1
5230 curs 0,0,141: curs 10,0,142
5240 INK 7: OVER 0
5250 END DEFine
6500 DEFine PROCedure init_udg
6510 mcadr=RESPR(161): RESTORE 9500
6520 FOR i=0 TO 160: READ d: POKE mcadr+i,d
6530 CALL mcadr
6540 END DEFine
7400 DEFine PROCedure init_level
7410 CLS
7420 FOR i=1 TO 100: BEEP 100,2*i MOD 20: INK i MO
D 8: POINT RND(200),RND(100)
7430 INK 7
7440 AT 1,5: PRINT "SCORE:00000"
7450 AT 1,22: PRINT "HIGH:00000"
7460 AT 19,14: PRINT "BONUS:0"
7470 print_scores: print_level_etc
7480 READ maxp,bonus,maxc: DIM cols(maxc)
7490 mpcount=0
7500 AT 19,14: PRINT "BONUS:";bonus
7510 FOR i=1 TO maxc: READ cols(i)
7520 READ fcol1,fcol2,fcol3
7530 DIM scr(12,14)
7540 grad_y=RND(2 TO 7): pitch_2=RND(45)
7550 OVER 1
7560 FOR i=2 TO 11
7570 READ word: wbin$=bin$(word)
7580 FOR n=2 TO 13
7590 scr(i,n)=wbin$(n-1)*(maxc+1)
7600 IF scr(i,n) THEN BEEP 1000,20+50/i,pitch_2,0,
-grad_y: felt -24+n*30+i MOD 2*16,12+i*14
7610 END FOR n
7620 END FOR i
7630 OVER 0
7640 READ maxpos: DIM kugpos(maxpos,2)
7650 FOR i=1 TO maxpos: READ kugpos(i,1),kugpos(i,
2)
7660 READ mstartlin,mstartkol
7670 init_positioner
7680 END DEFine
8000 DEFine FuNction bin$(dec)
8010 LOCal i,res$: res$=""
8020 FOR i=1 TO 12
8030 res$=(dec MOD 2)&res$
8040 dec=dec DIV 2
8050 END FOR i
8060 RETurn res$
8070 END DEFine
8200 DEFine PROCedure init_positioner
8210 mlin=mstartlin: mkol=mstartkol
8220 mconts=scr(mlin,mkol): scr(mlin,mkol)=-1
8230 figur mlin,mkol,2,139
8240 rndval=RND(1 TO maxpos)
8250 klin=kugpos(rndval,1): kkol=kugpos(rndval,2)
8260 kconts=scr(klin,kkol): scr(klin,kkol)=-2
8270 scr(klin,kkol)=-2: figur klin,kkol,3,137
8280 END DEFine
8400 DEFine PROCedure print_scores
8410 AT 1,16-LEN(score): PRINT score
8420 AT 1,32-LEN(high): PRINT high
8430 END DEFine
8600 DEFine PROCedure print_level_etc
8610 AT 19,3: PRINT "LEVEL:00"
8620 AT 19,11-LEN(level): PRINT level
8630 AT 19,27: PRINT "LIVES:";lives
8640 END DEFine
8800 DEFine PROCedure sound(st,nd)
8810 LOCal i
8820 FOR i=st TO nd STEP 1-2*(st>nd): BEEP 500,i:
PAUSE 1
8830 END DEFine
9500 DATA 118,255,32,124,0,1,0,1,34,124,0,0,0,0,69
,250,0,8,112,37,78,67,78,117,128,14
9510 DATA 4,12,28,60,60,60,60,60,60
9520 DATA 124,124,124,124,124,124,124,124,124
9530 DATA 64,96,112,120,120,120,120,120,120
9540 DATA 64,96,112,120,124,124,124,124,124
```

```
9550 DATA 0,0,0,0,124,124,124,124,124
9560 DATA 4,12,28,60,124,124,124,124,124
9570 DATA 124,60,28,12,4,0,0,0,0
9580 DATA 124,124,124,124,124,0,0,0,0
9590 DATA 124,120,112,96,64,0,0,0,0
9600 DATA 12,16,44,60,60,60,60,28,12
9610 DATA 96,48,120,120,120,120,120,112,96
9620 DATA 60,124,124,124,60,28,8,8,12
9630 DATA 96,48,120,124,124,96,64,64,48
9640 DATA 0,28,60,124,60,28,0,0,0
9650 DATA 0,96,112,120,112,96,0,0,0
10000 DATA 55,1000,1,4,5,1,7,32,96,112,240,248,504
,508,1020,1022,2046,1,2,8,10,8
10010 DATA 42,1200,1,1,7,6,5,112,96,80,144,136,264
,260,1020,1022,2046,3,2,7,2,8,2,9,10,8
10020 DATA 43,1200,1,5,4,1,3,508,360,292,360,216,5
04,248,264,216,240,7,2,5,2,6,2,7,2,8,2,9,2,10,2,11
,8,8
10030 DATA 41,1400,1,4,7,2,1,508,504,112,96,112,24
0,216,408,396,780,7,2,5,2,6,2,7,2,8,2,9,2,10,2,11,
6,8
10040 DATA 102,1500,2,2,7,6,5,1,1122,1188,1686,182
0,1806,1820,1686,1460,360,584,4,2,3,2,7,2,8,2,12,1
1,7
10050 DATA 50,2000,2,0,3,6,1,5,32,96,112,240,248,2
40,112,96,32,0,1,2,8,10,8
10060 DATA 50,2000,1,7,6,2,4,112,240,216,408,396,7
80,1022,2046,1539,3075,3,2,7,2,8,2,9,8,8
10070 DATA 86,2200,2,7,0,6,1,5,260,780,396,924,508
,1020,396,780,260,516,2,2,5,2,11,6,8
10080 DATA 53,2500,1,6,3,2,7,476,1020,774,1020,508
,504,248,240,112,96,4,2,5,2,6,2,10,2,11,10,8
```

File Finder
Geoff Garside

File Finder is for those of you who keep lots of programs on a single Microdrive and cannot remember what you called them. The program enables you to load files with a single keystroke.

```
100 REMark  **                    G. Garside      **
110 REMark  ** Automatic Basic File Selection **
120 REMark  ------------------------------------
130 CLEAR:MODE 4
140 WINDOW 512,256,0,0:PAPER 0:CLS
150 WINDOW #2,512,200,0,0:PAPER #2,0:INK #2,7
160 dev$="mdv1_":fil$=dev$ & "temp"
170 OPEN_NEW #3,fil$
180 DIR #3,dev$
190 OPEN_IN #3,fil$
200 f=-3
210 REPeat loop
220  IF EOF(#3) THEN EXIT loop
230  INPUT #3,a$
240  f=f+1
250 END REPeat loop
260 DIM f$(f-1,20)
270 OPEN_IN #3,fil$
280 INPUT #3,vol$;sect$
290 k=0
300 FOR j=0 TO f-1
310  INPUT #3,f$(k)
320  REPeat loop
330   IF f$(k)="temp" THEN EXIT loop
340   IF "_doc" INSTR f$(k) THEN EXIT loop
350   IF "_aba" INSTR f$(k) THEN EXIT loop
360   IF "_bin" INSTR f$(k) THEN EXIT loop
370   IF "_scn" INSTR f$(k) THEN EXIT loop
380   IF "_dbf" INSTR f$(k) THEN EXIT loop
390   k=k+1:EXIT loop
400  END REPeat loop
410 END FOR j
420 f=k
430 CLOSE #3
440 DELETE fil$
450 OPEN #3,scr_512x22a0x0:INK #3,2:BORDER #3,1,7
460 OPEN #4,scr_512x22a0x234:BORDER #4,1,2
470 WINDOW 512,212,0,22
```

```
480 CSIZE #3,3,1:AT #3,0,2:PRINT #3,vol$;
490 CSIZE #3,0,0:AT #3,0,65:PRINT #3,f;" Files";
500 AT #3,1,65:PRINT #3,sect$;
510 IF f>26 THEN
520  AT #4,0,4:INK #4,7:PRINT #4,"<";CHR$(191);">"
;
530  INK #4,4:PRINT #4," or ";
540  INK #4,7:PRINT #4,"<";CHR$(190);">";
550  INK #4,4:PRINT #4," to change Page"
560 END IF
570 INK #4,7:AT #4,1,4:PRINT #4,"<A>";
580 INK #4,4:PRINT #4," to ";
590 INK #4,7:PRINT #4,"< >";
600 INK #4,4:PRINT #4," to select File";TO 44;
610 INK #4,7:PRINT #4,"<^F5>";
620 INK #4,4:PRINT #4," to Quit"
630 pg=0:pm=INT(f/27)
640 REPeat loop
650  i=0:k=4:l=4
660  REPeat loop1
670   IF f>26 THEN AT 1,5:INK 2:PRINT"Page ";pg+1
680   j=pg*26+i
690   IF j>f-1 THEN EXIT loop1
700   IF i>25 THEN EXIT loop1
710   IF i>12 THEN k=44:l=-9
720   AT i+l,k:INK 7:PRINT "<";CHR$(i+65);">";TO k
+8;
730   INK 4:PRINT f$(i+26*pg)
740   i=i+1
750  END REPeat loop1
760  AT #4,1,12:INK #4,7:PRINT #4,CHR$(64+i);
770  REPeat loop2
780   z=CODE(INKEY$(-1))
790   SELect ON z
800    =65 TO 90,97 TO 122
810     IF z>90 THEN z=z-32
820     IF z<i+65 THEN
830      fil$=f$(z-65+26*pg)
840      EXIT loop
850     END IF
860    =208
870     IF pg>0 THEN pg=pg-1:EXIT loop2
880    =216
890     IF pg<pm THEN pg=pg+1:EXIT loop2
900    =250
910     CLOSE #3:CLOSE #4
920     WINDOW 512,256,0,0:CLS
930     CLS #0
940     NEW
950   END SELect
960  END REPeat loop2
970  CLS
980 END REPeat loop
990 WINDOW 512,256,0,0:CLS
1000 LRUN dev$ & fil$
```

Cosmic Revolution

A Didcock

This stategy game plays on the popular idea of an old galactic Empire divided between Imperial ideals and the Rebel Forces. Using largely text and adventure problems, the aim is to lead the rebel forces to victory and form the second Empire; also discovering the location of the mysterious second Foundation – the one system that owes its allegiance to no-one, except the future Empire.

Before you run the program type **WINDOW** 512, 256, 0, 0, the game must be played in lower case.

```
100 REMark ### COSMIC REVOLUTION ###
101 :
102 REMark ######  A.DIDCOCK  ######
103 :
104 REMark _____________________
105 :
110 REPeat game
200 initialise
210 f_level
220 set_up_screen
299 :
300 REPeat main_loop
310  user_input
315  IF end_g THEN EXIT main_loop
320  prob=INT((100/(tot_h+tot_c))*tot_h)
325  IF go1=0 THEN
330   computer_action
340   prob=INT((100/(tot_h+tot_c))*tot_h)
350  END IF
360  IF tot_h<=0 OR tot_c<=0 OR ar(base)=tot_c THE
N EXIT main_loop
380  year=year+1E-2
385  go1=go1+1:IF go1>=lev THEN go1=0
390 END REPeat main_loop
400 end_game
410 END REPeat game
999 :
1000 DEFine PROCedure user_input
1010 INK #5,2:CSIZE #5,2,0:CLS #5
1020 UNDER #5,1:AT #5,0,14:PRINT #5,"MAIN MENU":UN
DER #5,0
1030 INK #5,4
1040 AT #5,1,4:PRINT #5,"1: GENERAL INFORMATION"
1050 AT #5,2,4:PRINT #5,"2: ATTACK"
1060 AT #5,3,4:PRINT #5,"3: DEFEND"
1070 AT #5,4,4:PRINT #5,"4: OTHER"
1080 INK 7:CSIZE 2,0:STRIP 1:AT 23,8:INPUT "PLEASE
 ENTER OPTION NO. ";opt;
1085 BEEP 1000,40
1090 IF opt<1 OR opt>4 THEN GO TO 1010
1100 SELect ON opt
1110  =1:information
1120  =2:attack
1130  =3:defend
1140  =4:other
1150 END SELect
1160 END DEFine
1999 :
2000 DEFine PROCedure information
2010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,10:PRINT #
5,"GENERAL INFORMATION":UNDER #5,0
2020 INK #5,4
2030 AT #5,2,5:PRINT #5,"DATE: ";year
2040 AT #5,3,5:PRINT #5, "PROBABILITY OF VICTORY:
";prob;"%";
2042 AT #5,4,5:PRINT #5,"TOTAL REBEL FORCE (UNITS)
 = ";tot_h
2045 call_system
2046 INK #5,7:FLASH #5,1:AT #5,5,21:PRINT #5,"PRES
S ANY KEY":PAUSE 40000:BEEP 1000,20:FLASH #5,0
2047 END DEFine
2048 :
2049 DEFine PROCedure call_system
2050 INK 7:AT 23,3:INPUT "ENTER REQUIRED SYSTEM CO
-ORD: ";no$;
2060 BEEP 1000,30
2070 cde=CODE(no$)
2080 IF cde<49 OR cde>102 OR (cde<97 AND cde>57) T
HEN GO TO 2050
2090 IF cde<58 THEN sys=no$: ELSE sys=(cde-87)
2095 IF sys>15 THEN GO TO 2050
2100 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,14:PRINT #
5,"SYSTEM '";no$;"'":UNDER #5,0
2110 INK #5,3,6
2120 AT #5,2,1:PRINT #5,"NAME: ";name$(sys):AT #5,
2,22:PRINT #5,"ARMED UNITS: ";ar(sys);"%"
2130 AT #5,3,1:PRINT #5,"NUMBER OF PLANETS: ";pl(s
ys)
2140 AT #5,4,1:PRINT #5,"STATUS: ";des$(sys)
2160 END DEFine
2999 :
3000 DEFine PROCedure attack
3010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: ATTACK":UNDER #5,0
3020 INK 7:AT 21,3:INPUT "Enter the system to atta
ck: ";no$;
3030 BEEP 1000,20
3040 cde=CODE(no$)
3050 IF cde<49 OR cde>102 OR (cde<97 AND cde>57) T
HEN GO TO 3010
3060 IF cde<58 THEN sys=no$: ELSE sys=(cde-87)
3070 IF sys>15 THEN GO TO 3010
3075 IF f(sys)=4 OR f(sys)=6 OR f(sys)=12 THEN GO
TO 3010
```

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```
3080 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: ATTACK":UNDER #5,0
3090 INK #5,3,6
3100 AT #5,1,0:PRINT #5,"SYSTEM '";no$;"'":AT #5,2
,1:PRINT #5,"NAME: ";name$(sys):AT #5,3,1:PRINT #5
,"ARMED UNITS: ";ar(sys);"%"
3110 AT 23,3:INPUT "Enter the attacking system: ";
no$;
3120 BEEP 1000,10
3130 cde=CODE(no$)
3140 IF cde<49 OR cde>102 OR (cde<97 AND cde>57) T
HEN GO TO 3110
3150 IF cde<58 THEN syt=no$: ELSE syt=(cde-87)
3160 IF syt>15 THEN GO TO 3110
3170 IF f(syt)<>4 AND f(syt)<>6 AND f(syt)<>12 THE
N GO TO 3110
3180 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: ATTACK":UNDER #5,0
3190 INK #5,4,6
3200 AT #5,1,0:PRINT #5,"SYSTEM '";no$;"'":AT #5,2
,1:PRINT #5,"NAME: ";name$(syt):AT #5,3,1:PRINT #5
,"ARMED UNITS: ";ar(syt);"%"
3210 dist=SQRT(((co(syt,1)-co(sys,1))*(co(syt,1)-c
o(sys,1)))+((co(syt,2)-co(sys,2))*(co(syt,2)-co(sy
s,2))))
3220 dist1=ABS(INT(dist/2))
3230 AT #5,4,1:PRINT #5,"DISTANCE FROM ENEMY SYSTE
M = ";dist1;"Ly"
3240 INK #5,7:FLASH #5,1
3245 AT #5,5,8:PRINT #5,"PRESS ANY KEY TO ATTACK":
FLASH #5,0
3250 PAUSE 40000:BEEP 1000,1
3260 CLS #5:INK #5,6,2:FLASH #5,1
3270 AT #5,1,3:PRINT #5,name$(syt);" IS ATTACKING
";name$(sys):FLASH #5,0
3280 dec=INT(ar(syt)-(dist1/2.5))
3282 INK 5,1:LINE co(syt,1),co(syt,2) TO co(sys,1)
,co(sys,2)
3285 INK #5,2:art=ar(sys):ary=ar(syt)
3286 rand=RND(0 TO 10):won=0
3287 FOR i=1000 TO 0 STEP -3:BEEP 100,i/10,25,25,0
,0:END FOR i
3290 IF ((rand<10 AND dec>=ar(sys)) OR rand=0 OR b
ase=syt) AND base<>sys THEN
3295  INK 2:LINE co(syt,1),co(syt,2) TO co(sys,1),
co(sys,2)
3300  des$(sys)=des$(syt):f(sys)=f(syt)
3310  ar(sys)=INT(ar(sys)*.6):ar(syt)=INT(ar(syt)*
.8)
3320  AT #5,3,3:PRINT #5,name$(syt);" HAS DEFEATED
 ";name$(sys)
3330  tot_h=tot_h+(ar(sys)+ar(syt))-ary:tot_c=tot_
c-art
3332  IF tot_c<1 THEN tot_c=0
3335  won=1
3340 END IF
3350 IF ((rand=10 AND ar(sys)>0) OR dec<ar(sys)OR
base=sys) AND NOT won THEN
3355  INK 7:LINE co(syt,1),co(syt,2) TO co(sys,1),
co(sys,2)
3360  des$(syt)=des$(sys):f(syt)=f(sys)
3370  ar(syt)=INT(ar(syt)*.6):ar(sys)=INT(ar(sys)*
.8)
3380  AT #5,3,3:PRINT #5,name$(sys);" HAS DEFEATED
 ";name$(syt)
3390  tot_c=tot_c+(ar(sys)+ar(syt))-art:tot_h=tot_
h-ary
3395  IF tot_h<1 THEN tot_h=0
3400  won=1
3410 END IF
3420 IF NOT won THEN GO TO 3286
3430 INK #5,7:AT #5,5,9:PRINT #5,"PRESS ANY KEY"
3440 PAUSE 40000:BEEP 1000,60
3450 END DEFine
3999 :
4000 DEFine PROCedure defend
4010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: DEFEND":UNDER #5,0
4020 INK 7:AT 21,3:INPUT "Enter the system to defe
nd: ";no$;
4030 BEEP 1000,20
4040 cde=CODE(no$)
4050 IF cde<49 OR cde>102 OR (cde<97 AND cde>57) T
HEN GO TO 4010
4060 IF cde<58 THEN sys=no$: ELSE sys=(cde-87)
4070 IF sys>15 THEN GO TO 4010
4080 IF f(sys)<>4 AND f(sys)<>6 AND f(sys)<>12 THE
N GO TO 4010
4090 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: DEFEND":UNDER #5,0
4100 INK #5,2,6:AT #5,2,1:PRINT #5,name$(sys);" HA
D ";ar(sys);"% ARMED UNITS."
4110 ar(sys)=ar(sys)+10:tot_h=tot_h+10
4120 IF ar(sys)>100 THEN tot_h=tot_h-(ar(sys)-100)
:ar(sys)=100
4130 INK #5,6:AT #5,3,1:PRINT #5,name$(sys);" NOW
HAS ";ar(sys);"% ARMED UNITS"
4140 INK #5,2:AT #5,4,1:PRINT #5,"TOTAL REBEL FORC
E (UNITS) IS NOW ";tot_h
4150 INK #5,7:AT #5,5,13:PRINT #5,"PRESS ANY KEY"
4160 PAUSE 40000
4170 BEEP 1000,10
4180 END DEFine
4999 :
5000 DEFine PROCedure other
5010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,14:PRINT #
5,"MODE: OTHER":UNDER #5,0
5020 INK #5,4
5030 AT #5,1,4:PRINT #5,"1: RESEARCH and DEVELOPEM
ENT"
5040 AT #5,2,4:PRINT #5,"2: DEPLOY"
5050 AT #5,3,4:PRINT #5,"3: HELP"
5060 AT #5,4,4:PRINT #5,"4: SURRENDER"
5070 INK 7:CSIZE 2,0:STRIP 1:AT 23,8:INPUT "PLEASE
 ENTER OPTION NO. ";opt;
5080 BEEP 1000,40
5090 IF opt<1 OR opt>4 THEN GO TO 5010
5100 SELect ON opt
5110  =1: research
5120  =2: deploy
5130  =3: help
5140  =4: end_g=1:tot_h=5
5150 END SELect
5160 END DEFine
5999 :
6000 DEFine PROCedure research
6010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,7:PRINT #5
,"RESEARCH and DEVELOPEMENT":UNDER #5,0
6020 INK #5,4
6030 AT #5,2,4:PRINT #5,"1: WEAPON SYSTEMS"
6040 AT #5,3,4:PRINT #5,"2: STAR SHIPS"
6050 AT 23,7:INPUT "Enter the required area: ";opt
;
6060 BEEP 1000,30
6070 IF opt<1 OR opt>2 OR devel_h=opt THEN GO TO 6
010
6080 devel_h=opt
6090 END DEFine
6099 :
6100 DEFine PROCedure deploy
6110 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,15:PRINT #
5,"DEPLOY":UNDER #5,0
6115 INK #5,4
6120 IF devel_h=0 THEN AT #5,3,7:STRIP #5,2:FLASH
#5,1:PRINT #5,"WE HAVE NOTHING TO DEPLOY":FLASH #5
,0:STRIP #5,1:PAUSE 300:RETurn
6130 AT #5,2,4:PRINT #5,"1: WEAPON SYSTEMS"
6140 AT #5,3,4:PRINT #5,"2: STAR SHIPS"
6150 AT 23,1:INPUT "Enter the required system to D
EPLOY: ";opt;
6160 BEEP 1000,10
6170 IF opt<1 OR opt>2 OR devel_h<>opt THEN GO TO
6110
6180 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,15:PRINT #
5,"DEPLOY":UNDER #5,0
6190 AT 20,3:PRINT "Which star SYSTEM is to be":AT
 21,3:INPUT "re-equiped? ";no$;
6200 BEEP 1000,50
6210 cde=CODE(no$)
6220 IF cde<49 OR cde>102 OR (cde<97 AND cde>57) T
HEN GO TO 6180
6230 IF cde<58 THEN sys=no$: ELSE sys=(cde-87)
6240 IF sys>15 OR dep(sys)<>0 THEN GO TO 6180
6245 IF f(sys)<>4 AND f(sys)<>6 AND f(sys)<>12 THE
N GO TO 6180
6250 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,15:PRINT #
5,"DEPLOY":UNDER #5,0
6260 INK #5,3,6:AT #5,1,1:PRINT #5,"NAME: ";name$(
sys)
6270 AT #5,2,1:PRINT #5,"TO BE RE-EQUIPED WITH ";
6280 IF opt=1 THEN PRINT #5,"WEAPON SYSTEMS":ar(sy
s)=ar(sys)+20:tot_h=tot_h+20
```

```
6290 IF opt=2 THEN PRINT #5,"STAR SHIPS":ar(sys)=a
r(sys)+15:tot_h=tot_h+15
6300 IF ar(sys)>100 THEN tot_h=tot_h-(ar(sys)-100)
:ar(sys)=100
6310 dep(sys)=opt
6312 AT #5,3,1:PRINT #5,"ARMED UNITS NOW ";ar(sys)
;"%"
6320 INK #5,7:AT #5,5,12:PRINT #5,"PRESS ANY KEY":
PAUSE 40000:BEEP 1000,20
6330 END DEFine
6999 :
7000 DEFine PROCedure computer_action
7007 i=0:k=0
7010 CLS #5:INK #5,6:UNDER #5,1:AT #5,0,12:PRINT #
5,"BATTLE REPORT":UNDER #5,0
7020 INK #5,2
7025 INK #5,2:AT #5,2,3:PRINT #5,"DATE: ";year:
7026 count=0:INK #5,4:wa=RND(1 TO 10):IF wa<5 THEN
 w=1:ELSE w=-1
7027 IF w=1 THEN ww=1 :wi=15 :ELSE ww=15:wi=1
7030 REPeat compute
7040  FOR i=ww TO wi STEP w
7050   IF f(i)=4 OR f(i)=6 OR f(i)=7 OR f(i)=8 OR
f(i)=12 OR f(i)=1 THEN GO TO 7130
7060   st=ar(i)
7070   IF st<30+(count*10) THEN defend_c:RETurn
7080   j=INT(st/7)
7085   IF i+j>16 OR i-j<0  THEN j=j-1 : GO TO 7085
7086   IF count>0 THEN EXIT i
7090   FOR k=(i+j) TO (i-j) STEP -1
7100    IF f(k)<>4 AND f(k)<>6 AND f(k)<>12 THEN G
O TO 7120
7110    IF ar(k)+8<st OR ar(k)=tot_h THEN attack_c
:RETurn
7120   END FOR k
7130  END FOR i
7140  count=count+1
7150  IF count>7 THEN EXIT compute
7160 END REPeat compute
7170 INK #5,3,0:STRIP #5,7:FLASH #5,1:AT #5,4,11:P
RINT #5,"NO ENEMY ACTION!":FLASH #5,0:STRIP #5,1
7172 BEEP 10000,5
7175 PAUSE 200
7180 END DEFine
7199 :
7200 DEFine PROCedure defend_c
7210 ar(i)=ar(i)+10:tot_c=tot_c+10
7220 IF ar(i)>100 THEN tot_c=tot_c-(ar(i)-100):ar(
i)=100
7230 AT #5,3,3:PRINT #5,name$(i);" HAS BEEN REINFO
RCED"
7240 AT #5,4,3:PRINT #5,"ARMED UNITS: ";ar(i);"%";
"   (SYSTEM ";i;")"
7250 INK #5,7:AT #5,5,12:PRINT #5,"PRESS ANY KEY"
7260 PAUSE 40000
7270 BEEP 1000,10
7280 END DEFine
7299 :
7300 DEFine PROCedure attack_c
7310 dist=SQRT(((co(i,1)-co(k,1))*(co(i,1)-co(k,1)
))+((co(i,2)-co(k,2))*(co(i,2)-co(k,2))))
7320 dist1=ABS(INT(dist/2))
7330 INK #5,6,2:FLASH #5,1
7340 AT #5,1,3:PRINT #5,name$(i);" IS ATTACKING ";
name$(k):FLASH #5,0
7350 dec=INT(ar(i)-(dist1/2.5))
7355 INK 5,1:LINE co(k,1),co(k,2) TO co(i,1),co(i,
2)
7360 INK #5,2,5:art=ar(i):ary=ar(k)
7370 rand=RND(0 TO 10):won=0
7380 FOR j=1000 TO 0 STEP -3:BEEP 100,i/10,25,25,0
,0:END FOR j
7390 IF (rand<10 AND dec>=ar(k)) OR rand=0 THEN
7400  des$(k)=des$(i):f(k)=f(i)
7410  ar(k)=INT(ar(k)*.6):ar(i)=INT(ar(i)*.8)
7430  AT #5,3,3:PRINT #5,name$(i);" HAS DEFEATED "
;name$(k)
7435  INK 7:LINE co(k,1),co(k,2) TO co(i,1),co(i,2
)
7440  tot_c=tot_c+(ar(k)+ar(i))-art:tot_h=tot_h-ar
y
7445  IF tot_h<1 THEN tot_h=0
7450  won=1
7460 END IF
7470 IF ((rand=10 AND ar(k)>0) OR dec<ar(k)OR base
=k) AND NOT won THEN
7475  INK 2:LINE co(k,1),co(k,2) TO co(i,1),co(i,2
)
7480  des$(i)=des$(k):f(i)=f(k)
7490  ar(i)=INT(ar(i)*.6):ar(k)=INT(ar(k)*.8)
7500  AT #5,3,3:PRINT #5,name$(k);" HAS DEFEATED "
;name$(i)
7510  tot_h=tot_h+(ar(k)+ar(i))-ary:tot_c=tot_c-ar
t
7520  IF tot_c<1 THEN tot_c=0
7530  won=1
7540 END IF
7550 IF NOT won THEN GO TO 3286
7560 INK #5,7:AT #5,5,12:PRINT #5,"PRESS ANY KEY"
7570 PAUSE 40000:BEEP 1000,60
7580 END DEFine
7999 :
8000 DEFine PROCedure help
8010 CLS #5:INK #5,2:UNDER #5,1:AT #5,0,13:PRINT #
5,"MODE: HELP":UNDER #5,0
8020 INK #5,5,3
8030 IF prob>50 THEN
8040  AT #5,3,5:PRINT #5,"YOU SEEM TO HAVE NO PROB
LEM!"
8050  INK #5,7:AT #5,5,12:PRINT #5,"PRESS ANY KEY"
8060  PAUSE 40000:BEEP 1000,1,200,60,50,60
8070  RETurn
8080 END IF
8090 IF prob<51 AND prob>10 THEN
8100  AT #5,2,1:PRINT #5,"YOUR CRISIS HAS BEEN ANT
ICIPATED . . ."
8110  INK #5,5,2:AT #5,3,2:PRINT #5,"'I suggest th
at you set up a union.'"
8120  INK #5,7:AT #5,5,12:PRINT #5,"PRESS ANY KEY"
8130  PAUSE 40000:BEEP 1000,1,200,60,50,60
8140  RETurn
8150 END IF
8160 IF prob<11 THEN AT #5,3,7:PRINT #5,"I THINK Y
OU SHOULD QUIT!":GO TO 8120
8170 END DEFine
9999 :
10000 DEFine PROCedure set_up_screen
10010 WINDOW 512,256,0,0
10020 SCALE 100,0,0
10030 OPEN #4,scr_500x15a6x5
10040 OPEN #5,scr_480x70a16x180
10050 PAPER 0:BORDER 5,5:CLS
10060 PAPER #4,4:BORDER #4,2,2:CLS #4
10070 PAPER #5,1:BORDER #5,1,7:CLS #5
10075 INK #4,2,1
10080 CSIZE #4,3,0:AT #4,0,6:PRINT #4,"COSMIC  REV
OLUTION"
10085 INK 7:FOR i=1 TO 100:POINT RND(0 TO 148),RND
(30 TO 93)
10086 col=9
10090 FOR i=1 TO 15
10100  co(i,1)=col:co(i,2)=INT(RND(37 TO 87))
10110  INK 6:FILL 1:CIRCLE co(i,1),co(i,2),.5:FILL
 0
```

3D Noughts & Crosses – Correction

Sharp eyed readers will notice we lost a small part of 3D Noughts and crosses in the July Issue. here are the missing lines, together with our apologies.

```
360       FOR i = 1 TO 76
370         IF path_value(i) = me% * 3 THEN RETurn find_sq
uare (i)
380           IF path_value(i) = you% * 3 THEN p% = i
390       END FOR i
400       IF p% > 0 THEN RETurn find_square (p%)
410    END IF
420    maxval = -1 : sq% = 0
430    FOR i = 1 TO 64
440       IF board%(i) = 0 THEN
450          val = 0 : my2_count% = 0 : your2_count% = 0
460          FOR j = 1 TO sq_to_path%(i,0)
470             pathv = path_value(sq_to_path%(i,j))
480             IF pathv <> dead% THEN
490             IF pathv = 2 * me% THEN my2_count% = my2
_count% + 1
```

MICRODRIVE EXCHANGE

Program of the Month

Starting in this issue, every month Microdrive Exchange will feature a Program of the Month. From the software published in The Progs we will select one program of outstanding quality for inclusion in the Microdrive Exchange.

Program of the Month for August is *Mushyman,* by J M Dower, A SuperBasic arcade game which appeared in the June and July Issues of *Sinclair QL World.*

Because of the faster turnround of software on Microdrive Exchange, we may no longer be able to feature programs for the length of time which has been possible in the past. Where a program is about to be deleted from the list, we will try to warn readers in the previous issue but, to make sure of your order, we suggest you send the form as soon as possible.

HOW TO ORDER

Listed below are programs which have appeared as listings inside *QL World/QL User* and *Sinclair QL World.*

To the right of each program entry is a small box, which you should mark with a bold cross if you want to order that program.

Once you have put a cross next to all the programs you wish to have copied onto microdrive, simply complete the rest of the order form and send it along with your PO/cheque AND BLANK FORMATTED DRIVE to:

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ORDER FORM

Author	Language	Program Name	Price	Issue	Size	
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Converts Assembler source into m/c object code						
Richard Cross	(AO)	Mini Monitor	£3.00	Oct	60	☐
Pocket sized monitor with comprehensive facilities						
A Didcock	(B)	Connect4	£1.00	Sept	15	☐
Pit your wits against the QL						
Shergold & Tose	(B)	*Golf	£2.00	May	35	☐
From fairway to green on 50 different courses of varying difficulty						
Williams & Holliday	(AO)	Paladin	£5.00	Apr	70	☐
The basis of our games programming series – a space invaders type game written entirely machine code						
Richard Cross	(MB)	Sprite Animation	£2.00	Apr	50	☐
A subtle blend of machine code and SuperBasic that produces a versatile sprite designer and high speed animator						
Steve Deary	(B)	Pacman	£1.00	Mar	20	☐
A reasonably fast rendition of the famous arcade favourite						
Andy Carmichael	(B)	Family Tree	£3.00	Aug	100	☐
Archive program and database for setting up and displaying large family trees						
James Lucy	(B)	Composer	£3.00	Oct	50	☐
Composer and play sheet music on the QL						
J M DOWER	(B)	Mushyman	£2.00	Jun/Jul '86	15	☐
Mushroom munching arcade action.						
P J Smith	(B)	*DIY Adventure	£1.00	Feb	60	☐
A skeleton framework where you simply have to slot in the details to create your bespoke adventure						
R Green	(B)	Qthello	£1.00	Aug	25	☐
A 3D version of the well known board game Othello for one or two players						
S J Ackers	(B)	*Touch Type	£4.00	Aug	80	☐
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Rob Sherratt	(AO)	FCOPY	£4.00	Mar '86	80	☐
A machine code microdrive utility for turbocharged file copying						
Alan Prior	(B)	World Map	£2.00	Mar '86	80	☐
A high resolution multi-coloured map of the world for geography buffs						

B = SuperBasic, AO = Assembler + Object Code (ready to run), MB = Machine Code + Basic loader

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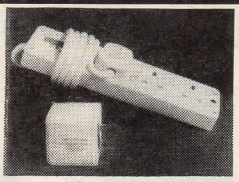

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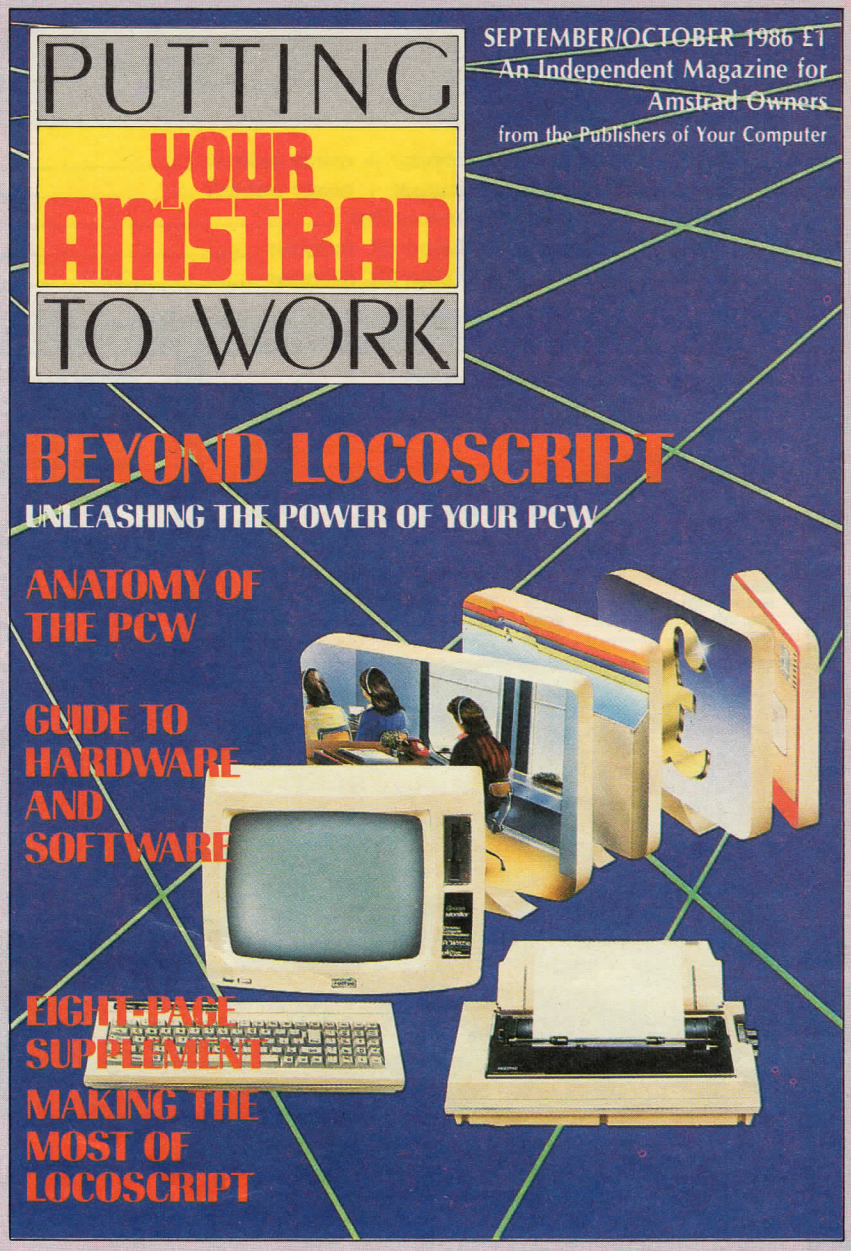

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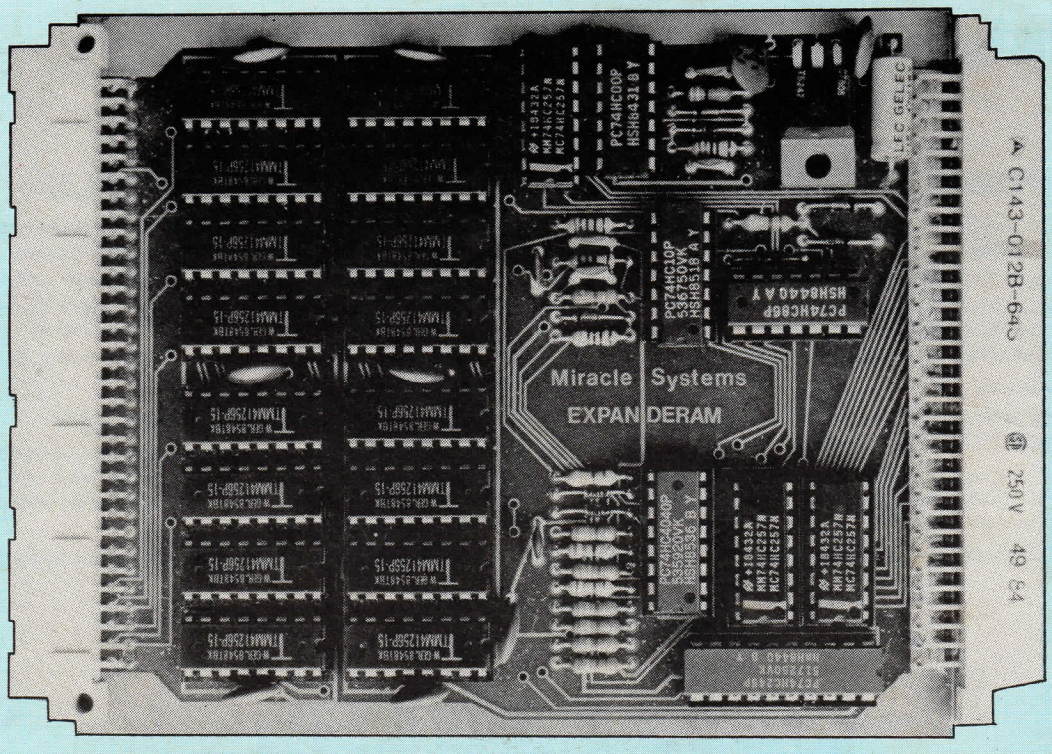

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